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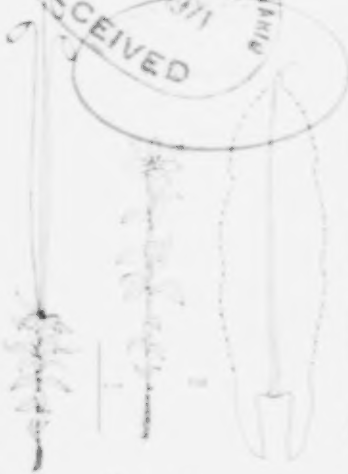

Mnium insigne

Some Common Mosses of British Columbia

By W. B. SCHOFIELD
Department of Botany
The University of British Columbia

Illustrations by Patricia Drucker-Brammall

VICTORIA, BRITISH COLUMBIA MAY, 1969

BRITISH COLUMBIA
DEPARTMENT OF
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Some Common Mosses of British Columbia

By W. B. SCHOFIELD
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ILLUSTRATIONS BY PATRICIA DRUKKER-BRAMMALL

Printed by A. Sutton, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1969

PREFACE

Mosses are frequently considered to be too " difficult " for an amateur to recognize without the aid of a microscope. It is a pity because it is possible to recognize most genera and many species using only a simple hand-lens (12×) plus a well-illustrated book. The problem in Western North America, in particular, has been the absence of such a book. This little book hopes to begin to remedy this situation. The beauty of Mrs. Brammall's illustrations catches the essence of the plants as well as is possible without colour. Without her drawings, this book would have been impossible.

—W. B. S. (1968).

BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Scale of Miles
0
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100
200
132°
128°
124°
120°
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122°
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114°
ATLIN
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Rocky
Peace
TELEGRAPH CREEK
District
Mountains
River
District
ALASKA
PRINCE RUPERT
Cariboo
PRINCE GEORGE
District
QUEEN
CHARLOTTE
ISLANDS
HECATE
STRAIT
QUEEN
CHARLOTTE
SOUND
KAMLOOPS
Kootenay District
Okanagan
VANCOUVER
ISLAND
NANAIMO
VANCOUVER
VICTORIA
PACIFIC
OCEAN

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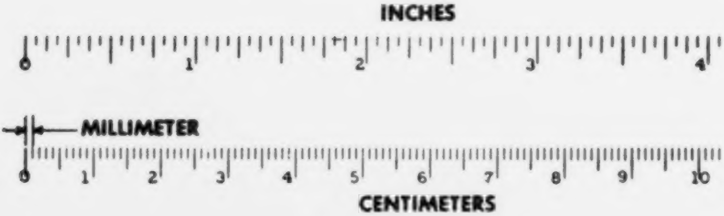
METRIC UNITS

10 millimetres (mm.) = 1 centimetre (cm.)
10 centimetres = 1 decimetre (dm.)
10 decimetres = 1 metre (m.)
1,000 metres = 1 kilometre (km.)

METRIC AND ENGLISH CONVERSION TABLE

LINEAR MEASURE

1 kilometre = 0.6214 mile
$$1 \text{ metre} = \begin{cases} 39.37 \text{ inches} \\ 3.2808 \text{ feet} \\ 1.0936 \text{ yards} \end{cases}$$
1 centimetre = 0.3937 inch
1 millimetre = 0.03937 inch
1 mile = 1.609 kilometres
1 yard = 0.9144 metre
1 foot = 0.3048 metre
1 foot = 304.8 millimetres
1 inch = 2.54 centimetres
1 inch = 25.4 millimetres


INCHES
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CENTIMETERS

Some Common Mosses of British Columbia

⁂

INTRODUCTION

Mosses in British Columbia

In British Columbia, mosses are nearly everywhere. In coniferous forests the floor is heavily carpeted by soft green mats; the trees of the foggy coast often carry filmy banners festooning the branches, and the trunks are sheathed by thick sleeves of mosses. Bogs and fens are composed entirely of wet spongy carpets of moss, varying from a vivid red purple through pale yellow and many shades of green. Over boulders and cliffs, tufts and mats of mosses soften the outline and enrich the landscape with varying colours, glowing vividly after a rain-storm.

Mosses invade lawns, particularly when shaded and moist much of the year, and even roofs and walls have tufts of moss squeezing among the shingles, between the tiles and into the neglected rain gutters. Among the paving-stones and cracks in sidewalks mosses establish themselves, and even on unpainted concrete or stone steps mosses find a niche and flourish. It is impossible to avoid encountering mosses, but possible to ignore them.

What Are Mosses?

Many people, including far too many botanists, do not understand what a moss is. Mosses belong to their own class of the plant kingdom, the *Musci*. They include those plants that have a leafy green gametophyte that lacks any true vascular system, and lacks roots. All mosses, if they reproduce sexually, produce a sporophyte which consists at least of a capsule containing spores. This capsule in most cases opens by means of a lid (*operculum*).

Many plants that resemble mosses are called mosses; the so-called " club-mosses " are actually leafy green plants that have a vascular system and roots, and the green plant is a sporophyte rather than a gametophyte; the spores of " club-mosses " actually produce the gametophyte that is never leafy and is rarely seen except by an experienced botanist who knows where to look or who cultures the spores.

" Reindeer mosses " are lichens; these are fungi that have trapped algæ in their plant body and live in dependence on these algæ. Other lichens that festoon tree branches are sometimes popularly called " mosses "—their lack of leaves and the nature of their structure soon identify them as lichens.

" Spanish moss " is a flowering plant, related to pineapple. It produces small flowers.

" Sea mosses " are marine algæ or seaweeds. These plants are aquatic, never leafy, and are confined to salt water. No true mosses live in salt water.

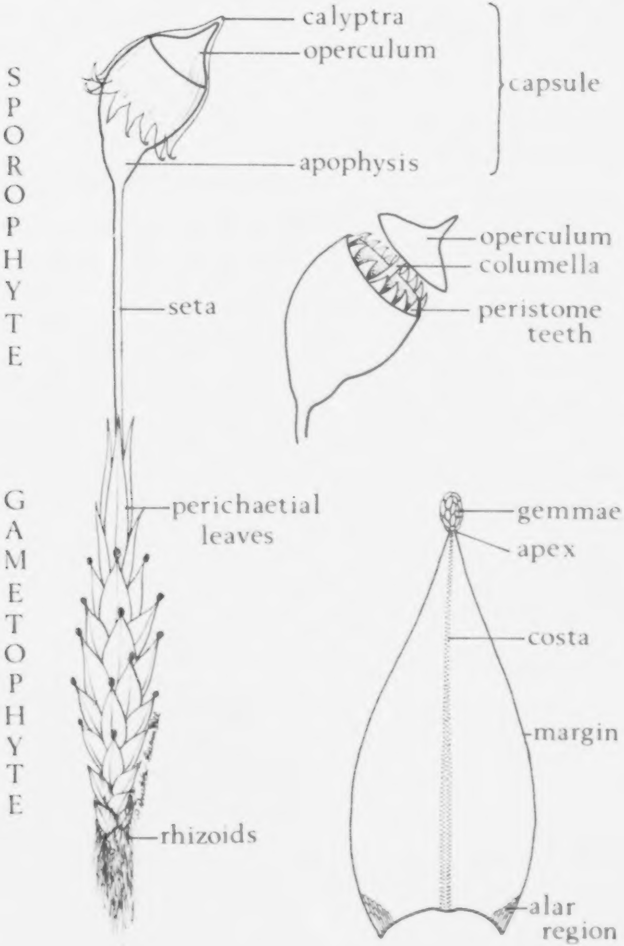
" Scale " mosses, the leafy liverworts (class Hepaticæ), are very closely related to mosses and can be mistaken for them. When they possess sporophytes, leafy liverworts can readily be distinguished from mosses; in hepatics the seta is very soft and collapses soon after the capsule sheds its spores; the capsule usually opens by means of four longitudinal slits so that the capsule opens rather like a flower with four petals; among the spores are corkscrew twisted threads (*elaters*) that are never present in mosses; these are visible at 12×. The gametophyte of leafy liverworts usually has the leaves in three ranks, two lateral and one ventral (on the undersurface). The lateral leaves frequently have a lobe (sometimes several lobes), and the underleaves are usually smaller and different in shape from the lateral leaves. Leaves never have a costa. The leaf arrangement in most leafy liverworts is complanate, thus the leafy shoot appears compressed. The ventral leaves are usually compressed against the surface of the stem and the lateral leaves are flattened in the same plane, but this means that they would expand outward like wings from the lateral surface of the stem. Such leaf arrangement is uncommon in mosses. A further difference, apparent only under the microscope, is that the rhizoids are unicellular. The archegonia of leafy liverworts are often surrounded by a special sleeve of fused leaves, the *perianth*. Such a structure is absent in mosses.

Liverworts are rather difficult to determine without the use of a microscope, but these beautiful small plants offer the same fascination as do the mosses, and British Columbia possesses a very rich flora, more than 220 species.

STRUCTURE OF A MOSS

A moss consists of two distinct parts, the *gametophyte* and the *sporophyte*. The gametophyte is the leafy green plant, attached to the substrate by *rhizoids*. If the plant produces female sex organs, these are usually protected by leaves, termed *perichætial leaves*. The leaf consists of several distinct regions: at the base, near the margin, are the *alar regions*. The cells of this region are sometimes different in size, shape, or colour from the remainder of the leaf. The edge of the leaf is termed its *margin;* the midrib is the *costa*. In the illustration are shown also *gemmæ* on the leaf apex. These are small masses of cells that fall off readily and can grow into a new leafy gametophyte if they reach a suitable environment.

The sporophyte grows partly as a parasite on the gametophyte. In most mosses it is made up of a stalk or *seta* and a *capsule* at the apex of the seta. The capsule is usually partially covered by a little cap, the *calyptra*. The capsule often has a swollen base, the *apophysis,* and a lid, the *operculum*. When the calyptra and operculum are shed, the *peristome* is revealed; this is the opening at the apex of the capsule and it usually has a ring of *peristome teeth* around it.


SPOROPHYTE
calyptra
operculum
capsule
apophysis
seta
operculum
columella
peristome teeth
GAMETOPHYTE
perichaetial leaves
rhizoids
gemmae
apex
costa
margin
alar region

SHAPES OF LEAVES

The illustrations opposite show the great diversity in shapes of moss leaves. Their constancy of shape within a species makes them most useful as a feature to aid in identifying it.

A. *Drepanocladus uncinatus:* ovate-lanceolate and falcate, with revolute margins.

B. *Rhytidium rugosum:* ovate with an acute apex.

C. *Hylocomium splendens:* ovate with a sinuous apex.

D. *Andreæa rupestris:* ovate with a blunt apex.

E. *Tortella tortuosa:* lanceolate, with somewhat undulate margins.

F. *Tortula muralis:* tongue-shaped, with an abrupt hair point.

G. *Mnium insigne:* oblong ovate to tongue-shaped with differentiated and toothed margin and a decurrent base.

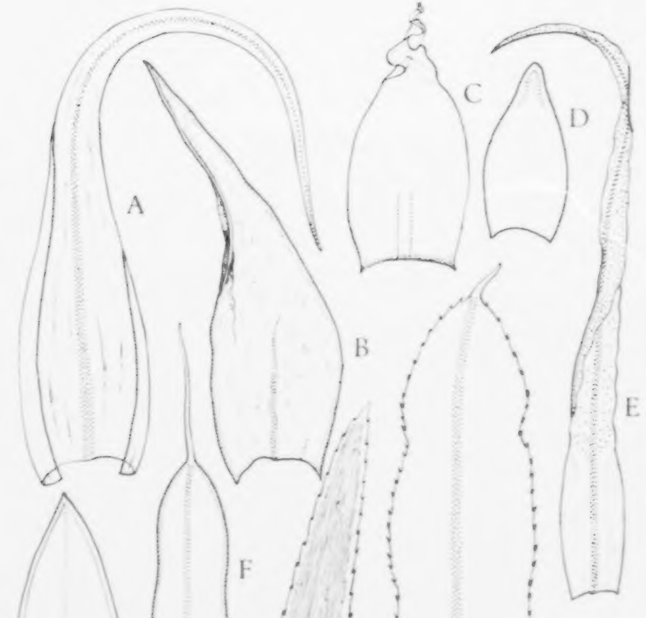
H. *Fissidens limbatus:* oblong, with differentiated margin and a sheathing flap emerging from the costa.

I. *Neckera menziesii:* oblong-ovate, undulate.

J. *Pogonatum contortum:* broadly lanceolate to oblong, with abundant lamellæ and toothed margins.

K. *Eurhynchium stokesii:* broadly heart-shaped.

L. *Antitrichia curtipendula:* ovate, toothed toward apex.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PDB

CAPSULES OF MOSSES

Capsules are of many shapes and are oriented in many different ways. Fortunately shape and orientation are consistent features of each moss species, and can be used to help identify the species.

A. *Eurhynchium stokesii:* shape — ovoid; orientation — inclined.

B. *Andreæa rupestris:* shape—elliptic (the gaping portion subspherical); orientation—erect.

C. *Leptobryum pyriforme:* shape—pear shaped; orientation—nodding.

D. *Schistostega pennata:* shape — spherical; orientation — erect.

E. *Dicranum fuscescens:* shape—cylindric, curved; orientation—inclined.

F. *Polytrichum juniperinum:* shape—rectangular; orientation —inclined.

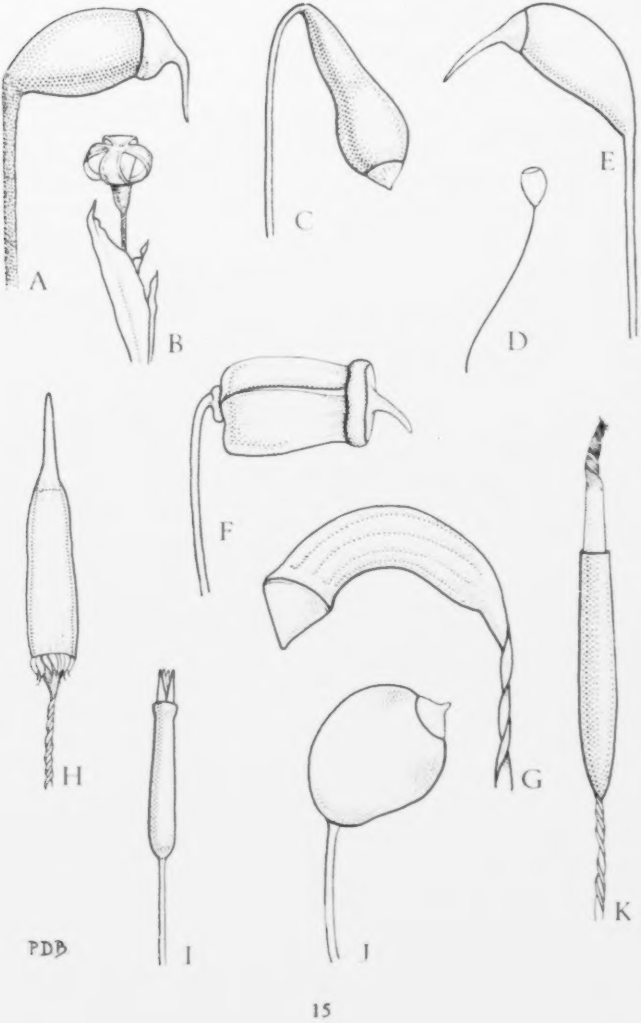
G. *Aulacomnium palustre:* shape—cylindric, curved; orientation—inclined.

H. *Encalypta ciliata* (with calyptra): shape—cylindric; orientation—erect.

I. *Tetraphis pellucida:* shape—cylindric; orientation—erect.

J. *Philonotis fontana:* shape—subspherical; orientation— suberect to inclined.

K. *Tortula princeps:* shape—cylindric; orientation—erect.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LIFE CYCLE OF A MOSS

The simplest stage in the life of a moss is the *spore*. The spore is generally wind or water borne. If it is deposited on a humid substrate, it usually germinates to produce a filament. This filament (the *protonema*) branches and creeps over the substrate. It differentiates into a chlorophyllose (green) cobwebby mass over the substrate and attaches itself to the substrate by colourless (or brownish) branches, the *rhizoids*. In time the protonema produces " buds " of cell masses. These buds differentiate an apical cell which gives rise to stems and leaves. This leafy *gametophyte* ultimately produces sex organs, either on a terminal or lateral branch. The female sex organ, the *archegonium*, is essentially microscopic and shaped like a tiny flask with an *egg* inside the flask. Each female sexual branch (*perichætium*) has a mass of protective leaves (*perichætial leaves*) surrounding several archegonia. When mature, each archegonium has cells in the neck of the flask-shaped archegonium that disintegrate and the fluid remains are exuded out the mouth of the flask. This happens only when sufficient moisture surrounds the archegonia. Meanwhile male sexual branches (*perigonia*) also surrounded by specialized leaves (*perigonial leaves*) have produced many male sex organs (*antheridia*). These antheridia are irregularly elliptic or spherical and contain numerous sperms surrounded by a single layer of sterile cells that make up the jacket of the antheridium. When mature and moist, the antheridial wall bursts and the many sperms are released into the water. Each sperm is microscopic and swims about by means of two terminal hair-like flagella that are in constant motion.

The fluid that has diffused from the archegonia into the water dissipates farther into the water. If a sperm should encounter a weak concentration of this archegonial fluid, it swims toward the stronger concentration of that fluid, thus ultimately down the neck of an archegonium and ultimately touches the egg. When a sperm touches the egg wall, it burrows through the wall and its nucleus unites with the nucleus of the egg. This cell is now the *zygote* and is the first stage of the *sporophyte*. All of the growth up to the production of the zygote has been in the gametophyte.

The gametophyte is the complex leafy plant in the moss. To choose a structural equivalent to this gametophyte in flowering plants, one would select the microscopic pollen grain or the embryo sac.

The zygote undergoes cell division, ultimately differentiating a stalk or *seta*. The archegonium also grows to form a sheath that surrounds the growing sporophyte; this sheath is the *calyptra*. As the seta elongates, the calyptra is torn from the apex of the gametophyte and persists as a protective cap at the apex of the sporophyte. Ultimately, beneath the calyptra and at the apex of the sporophyte, enlargement occurs as differentiation of the *capsule* proceeds. The capsule is wider in diameter than the seta. Further differentiation of the capsule results in (usually) a sterile jacket of cells forming the wall of the capsule; the differentiation of a weakened ring of cells cuts out the lid (*operculum*) around the apex of the capsule. Within the capsule there is generally a cylinder of numerous spore mother cells that surround a central cylinder (*columella*) of sterile cells. The many spore mother cells undergo meiosis, each producing four spores. These spores represent the first stage of the gametophyte. When the capsule is mature, the calyptra usually dries up and is carried away by a slight breeze. Further drying of the capsule causes it to shrink and the operculum breaks loose. Beneath the operculum are usually peristome teeth that ring the peristome. When these teeth dry out, they frequently flick outward, throwing spores out of the capsule as they flick. When moist they curve into the capsule, picking up more spores on their irregular surfaces, and throw these out as they dry again. The spores are then carried away by the wind. Some may ultimately reach a suitable site to germinate.

This process is described as *sexual reproduction*, but mosses are not completely dependent on sexual reproduction for effective propagation. Since the leafy gametophyte of a moss is structurally very simple, almost any living cell is capable of becoming the progenitor of an entire leafy gametophyte. Thus, if a gametophyte is fragmented into many pieces, each living fragment, in which there are some whole cells, can, if the substrate is humid enough and suitable illumination and temperature are available, produce a protonema, and ultimately this differentiates to produce a bud and finally a leafy gametophyte. Some mosses must reproduce entirely by this method of *asexual reproduction,* since no sex organs or sporophytes have been discovered in these same mosses. It must be a method widely used by all mosses, even in those that reproduce sexually. Sexual reproduction is very dependent on the coincidence of the proper conditions of moisture and the many stages that lead to the spore landing in a suitable habitat; this makes the process a very chancy one, particularly in an area where the suitable substrate may be limited and is soon invaded by organisms other than mosses.

Fortunately some moss spores remain in a living state for relatively long periods of time, and when the suitable conditions finally appear, they germinate. A further advantage possessed by many mosses is that the protonemal stage can also tolerate drying up for some duration. Of course not all mosses are so tolerant; thus they are restricted in the habitats that they can occupy.

Many mosses produce special masses of cells that break off the shoot readily. These are *gemmæ*. Mosses like *Tetraphis* and *Aulacomnium* commonly produce shoots terminated by masses of gemmæ. These are carried by wind or water to a new substrate, and there germinate to produce a protonema and in time a new leafy gametophyte which may produce more gemma-bearing shoots or both asexual shoots and those bearing sex organs. Some mosses have brittle leaves or stems; others are brittle when dry. Thus asexual reproduction is a highly effective process in producing fragments of the gametophyte, some of which may end up in an environment suitable for growth.

How to Collect Mosses

Collecting mosses is extremely simple. Most mosses are easily removed from the substrate, which, if of earth, can be carefully removed so that the moss is not damaged by it. Frequently a knife is needed to pry the moss loose from its substrate. The specimen then can be air-dried. No pressing is necessary. Normally the specimen is teased apart so that its growth appearance is clearly shown and it fits neatly into a folded packet. When collecting, the collector should endeavour to find sporophyte-bearing material. In some mosses, sporophytes are necessary for an accurate determination, and in most mosses the presence of sporophytes makes identification an easier process. Some mosses rarely produce sporophytes; therefore, even specimens lacking sporophytes should be collected. If the specimen is undeterminable, it can be discarded. A number of endemic and rare species in the Province, including *Acanthocladium carlottæ*, *Geheebia gigantea*, and *Leptodontium recurvifolium*, have never been collected with sporophytes.

When collecting mosses, the following data should be recorded and ultimately typed on the label of the packet containing the specimen:—

(1) Habitat—the substrate (rock, rotten wood, etc.), exposure (sunny, shaded), moisture (wet, submerged, dry), nature of surrounding vegetation (tundra, coniferous forest), elevation (if possible).

(2) Collector's name.

(3) Locality collected (example, Grafton Bay, Bowen Island, Howe Sound, British Columbia).

(4) Date collected (example, August 12, 1965).

(5) When the specimen is determined, the scientific name can be assigned to it.

Specimens can be collected into improvised paper packets made from newspaper. The sheet should be approximately 8 by 11 inches, or of approximately notepaper size. It is first folded from the bottom up to 3 inches from the top of the sheet. This entire 3-inch portion is then folded downward to make a flap over the packet. The two ends of the packet are then folded under, giving about 1-inch flaps. This produces a closed packet. Ultimately notepaper packets are used to store the dried specimens.

Usually a collector assigns a collection number to each specimen. This number then identifies the specimen for reference purposes. If a specimen is divided to make several packets, each is assigned the number of the original specimen.

Storage of specimens can be done easily and effectively by using shoe boxes (men's shoe boxes are of precisely the correct dimensions). The specimens are then placed in thin packets, treating them like file cards, in the shoe boxes. Initially a collection can be filed alphabetically by the name of the genus and species. Possession of an accurately determined collection will enable an amateur to compare undetermined material with the named specimens and gain confidence in determination. The collection placed in a permanent herbarium represents a scientific record of the presence of the species from a given area and, as the vegetation of an area disappears, is ultimately a fragment of the record of a past vegetation. Many mosses and other plants have been eliminated from many areas of the earth's surface. Collections made by both amateur and professional botanists of the past are the only remnants of this flora.

WHERE TO COLLECT MOSSES

The discussion under " Ecology of Mosses " (pp. 23–25) and " Distribution of Mosses in the Province " (pp. 25–34) will give a very good idea where mosses are most abundant and also what species will be found there. As mentioned earlier, mosses can be collected nearly anywhere in the Province. Humid forests and canyons and open cliffs where moisture is available give the richest floras.

Where humidity is constantly high and where habitats are present that are not occupied by flowering plants, mosses tend to be abundant and varied. In parts of the Province where there is a distinct and extended dry season or in which precipitation is low (as in the Interior), mosses tend to be less abundant and more restricted in distribution. In these localities the mosses are found in those habitats where moisture conditions and illumination are suitable. Surprisingly, boulders in sagebrush and the earth under the scattered shrubs have a number of mosses peculiar to them. These are usually inconspicuous during the dry season, but when wet they are more apparent.

WHEN TO COLLECT MOSSES

Mosses can be collected at any time of the year. In most areas of the Province the best time is in early spring, when the temperatures begin to rise and moisture is still available either from melting snow or from continuing precipitation. At this time the mosses appear most verdant and also are producing sporophytes. A number of mosses delay until the cooler humid autumn before the sporophytes are produced. Many mosses can be collected in summer however, since the sporophytes persist from the spring or from the preceding autumn, although both calyptra and operculum are likely to be gone, and in many cases the peristome teeth will have broken away. In those areas that have little snowfall in winter or in which the ground is not frozen, mosses can be collected in winter.

Of course at higher elevations on mountains collecting must be delayed until the mosses are exposed by the melting of the snow. Montane habitats have numerous different mosses in the vegetation. In some mountains late summer and early autumn yield great riches in moss-collecting.

History of Collectors

Although collection of mosses in the Province has not been great until recent years, casual collections were made as early as the latter portion of the 18th century, when Dr. Archibald Menzies, surgeon with the fur-trading vessel *Prince of Wales* in 1786 and 1789, made a number of collections, some possibly from the Province. During the expeditions of Capt. George Vancouver, Menzies was the surgeon-naturalist and made a number of collections of mosses between 1791 and 1795, some certainly from southern Vancouver Island.

The next important collection was made by Thomas Drummond during 1826 in the Rocky Mountains, and these specimens were distributed to various herbaria in 1828.

Dr. David Lyall made a number of important collections of mosses in the Province between 1858 and 1861. These collections include the richest representation of the moss flora up to that time. Lyall's collections were made during his tenure as naturalist for the exploration party marking out the 49th parallel boundary between the United States and Canada.

John Macoun, the Dominion Botanist, made numerous and highly important collections of mosses in the Province, the first being made in 1872 and the last, during his retirement in Vancouver

Island, in 1916. His contribution to the knowledge of mosses of the Province is probably the most important until recent time.

A significant collection was made by R [illegible]. Williams in 1898, on his way across the mountains of the White Pass route to Dawson, Yukon, during the time of the gold-rush. A number of amateurs have made significant collections in the Province in the earlier half of the present century; among these are A. H. Brinkman, Mrs. Faye MacFadden, and Mrs. Elizabeth MacKenzie.

Three Scandinavian botanists have made significant collections in British Columbia—T. Ahti (largely Wells Gray Park), V. Kujala (various localities), and H. Persson (Queen Charlotte Islands).

Dr. V. J. Krajina has made significant collections of mosses since 1949, and his students have contributed smaller collections. F. M. Boas has also made many important collections.

Since 1960 the author has made extensive collections of mosses in the Province, financed by the National Research Council of Canada. These collections, as well as duplicates of many earlier collections made by collectors discussed here, are housed in the herbarium of the University of British Columbia, the most comprehensive collection of mosses of the Province.

Mosses have attracted the interest of rather few amateurs, probably due to the necessity of a microscope for critical identification of material. The need for costly and extensive literature has probably further discouraged amateurs. A further problem, resulting from a fallacy, is the notion that " all mosses look alike." A quick leafing through the pages of this booklet will effectively dispel this idea.

Only the coastal portion of the Province has been well collected, and even here, especially at higher elevations, the moss flora is not well understood. There are extensive regions in the Province in which few or no mosses have been collected; this includes much of the Interior Plateau and a large proportion of the area north of it; even the Rocky Mountains and adjacent mountain ranges are in great need of careful exploration, and are likely to yield interesting species, possibly a number undescribed. Much of Vancouver Island and most of the fjordland of the Mainland and the islands that flank the Mainland have had no moss collections taken from them. Amateur collectors can make a very rich contribution to the understanding of the distributions of mosses in the Province.

ECOLOGY OF MOSSES

While mosses are widely distributed over the earth's surface, many mosses have very special requirements. Some mosses, for example, grow only on decayed animal waste; these include an entire family, the Splachnaceæ. Interestingly enough, many of these mosses also produce a foul smell that is said to attract flies. The fly, when it alights on the moss capsule, receives a dusting of moss spores. When the fly moves to other decayed matter, some of the spores fall to this new substrate. *Splachnum rubrum* (*see* p. 59) is one of these Splachnaceous mosses.

Sphagnum, the peat mosses, forms extensive quaking carpets in bogs and around lakes and ponds, especially in the boreal conifer forest. Some species of *Sphagnum* are aquatic, and thus float in the marginal waters of quiet water-bodies. The moss, as it grows, absorbs substances from the water, leaving the water highly acid. This acid water inhibits decay and permits rather few organisms to survive in it. Thus any organic material added to the water, either by growth of *Sphagnum* or by litter that blows into it, leads to a slow deposition of this material on the lake bottom. In time the lake slowly shrinks, the marginal shallows decreasing in depth and with a quaking mat of *Sphagnum* growing over the accumulating organic muck. As the lake fills in with organic material, other plants can move in on the *Sphagnum* mat, ultimately forest tree species. Initially there will be an open bog, later replaced by an open bog forest and finally by a closed forest.

Sphagnum growth, however, can also inhibit growth of forest trees. In some areas the *Sphagnum* expands from the open bog and colonizes the floor of the adjacent forest. The expansion of the *Sphagnum* population means that the growing moss absorbs water from adjacent colonies of *Sphagnum* that are in the water, the whole population acting as an immense absorptive sponge; thus water moves from the water-body or wet bog outward to the perimeter of the colony. If the margins invade a forest, it means that the water brought to the forest floor can drown out the roots of the forest trees and contribute to the death of the trees. With death of the trees, the increased illumination improves moss growth and the population expands farther into the surrounding forest. This destruction of forest by encroachment by *Sphagnum* bogs can be significant, particularly in the northern part of the Province.

Many mosses grow well on exposed rock faces. Since these same mosses can tolerate periods of complete drying out, they are well suited to such extreme environments. As the moss colony grows on the rock surface, its decaying remains produce various acids, hold moisture, and produce conditions suitable for the chemical breakdown of the rock surface itself. In time a primitive soil results, containing minerals from both chemical breakdown of the rock and decay of the moss itself. This soil retains moisture and serves as a substrate for flowering plants. Thus mosses act as pioneers on a rock surface and lead to final colonization of that surface by vascular plants. These plants further alter the substrate and cause shading, creating an unfavourable environment for the pioneer moss but a favourable environment to some woody plants. Slowly, then, the rock surface is colonized by scattered trees, and as the rock surface itself is broken down and covered by a building soil, the forest moves in.

With such a forest environment new habitats are created that favour still other mosses. Many mosses thrive under relatively low illumination and cannot tolerate high illumination, particularly when such habitats are dried out rapidly. The humid forest, then, frequently has luxuriant carpets of mosses, some growing on decaying logs, others up the bases of living trunks, and still others on the humus of the forest floor and as epiphytes on the trees. Thus the forest floor usually has several kinds of mosses, many restricted to a given substrate, but all influenced by the shade and humidity of the forest itself.

Some mosses grow best in habitats that are highly illuminated but in which humidity is high. Bogs and swamps supply such conditions, and here many mosses flourish, especially *Sphagnum*. The many species of *Sphagnum* each have particular sites in which they thrive; some are confined to wet depressions in the bog, others to the drier margins. Still others tolerate only certain degrees of acidity, and when this is exceeded that species dies, to be replaced by another moss that can tolerate the conditions.

Many mosses are very specific to substrate; for example, *Andreæa* is found only on acidic rocks, usually in exposed sites, while a number of species of *Tortula* are confined to rocks rich in lime. A number of mosses are common on cliffs in some parts of their range, while in other parts of their range they are confined largely to tree trunks. *Neckera menziesii*, for example, is a common species on tree trunks in the coastal portion of the Province, but in the Interior it is essentially confined to cliffs.

DISTRIBUTION OF MOSSES IN THE PROVINCE

1. A number of mosses range throughout the Province. Most are particularly common in the northern and the mountain portions of the Province. Considering only the mosses treated in this booklet, the following have this wide distribution:—

Amblystegium serpens.
Andreæa rupestris.
Aulacomnium palustre.
Bartramia pomiformis.
Blindia acuta.
Bryum argenteum.
Bryum capillare.
Ceratodon purpureus.
Climacium dendroides.
Cratoneuron filicinum.
Dicranella heteromalla.
Dicranum fuscescens.
Dicranum scoparium.
Distichium capillaceum.
Drepanocladus uncinatus.
Encalypta ciliata.
Fissidens adianthoides.
Fontinalis antipyretica.
Funaria hygrometrica.
Grimmia apocarpa.
Hedwigia ciliata.

Hygrohypnum luridum.
Hylocomium splendens.
Leptobryum pyriforme.
Mnium spinulosum.
Oncophorus wahlenbergii.
Philonotis fontana.
Plagiothecium denticulatum.
Pleurozium schreberi.
Pohlia cruda.
Pohlia nutans.
Pohlia wahlenbergii.
Polytrichum commune.
Polytrichum juniperinum.
Polytrichum piliferum.
Ptilium crista-castrensis.
Rhacomitrium aciculare.
Rhacomitrium canescens.
Rhacomitrium heterostichum.
Rhacomitrium lanuginosum.
Rhytidiadelphus triquetrus.
Sphagnum capillaceum.
Sphagnum palustre.
Sphagnum squarrosum.
Tetraphis pellucida.
Timmia austriaca.
Tortella tortuosa.
Tomenthypnum nitens.

These species are each restricted in its habitat, but in those in which the habitat is common, the populations are very large.

2. A number of species are confined largely to the coastal coniferous forests or, in some cases, reappear in the cedar-hemlock forests of the Interior:—

Antitrichia curtipendula.
Atrichum selwynii.
Aulacomnium androgynum.
Barbula cylindrica.
Brachythecium asperrimum.

Bryum miniatum.
Claopodium crispifolium.
Dendroalsia abietina.
Dichodontium flavescens.
Dicranella rufescens.
Dicranoweisia cirrhata.
Dicranum strictum.
Ditrichum heteromallum.
Eurhynchium oreganum.
Eurhynchium stokesii.
Fissidens limbatus.
Grimmia pulvinata.
Heterocladium heteropteroides.
Homalothecium lutescens.
Homalothecium nuttallii.
Hookeria lucens.
Hypnum circinale.
Hypnum subimponens.
Isothecium spiculiferum.
Leucolepis menziesii.
Mnium glabrescens.
Mnium insigne.
Neckera menziesii.
Oligotrichum aligerum.
Orthotrichum lyellii.
Plagiothecium elegans.
Plagiothecium undulatum.
Pogonatum contortum.
Pogonatum macounii.
Pohlia camptotrachela.
Rhytidiadelphus loreus.
Rhytidiadelphus squarrosus.
Scleropodium obtusifolium.
Scouleria aquatica.
Tortula muralis.
Tortula princeps.
Ulota obtusiuscula.

A number of mosses are restricted to rather dry climates, largely in the northern part of the Province and extending down the mountains east of the Cascades, but largely absent west of these mountains:—

Abietinella abietina.
Calliergon giganteum (wet sites).
Rhytidium rugosum.

Others are found only in subalpine and alpine regions in the Province:—

Kiaeria starkii.
Rhytidiopsis robusta.

Considered on the basis of the habitat, the mosses treated in this booklet may be divided as follows:—

1. Growing on dry rock surfaces subject to drying out:—
   Abietinella abietina (occasionally).
   Andreæa rupestris.
   Antitrichia curtipendula (occasionally).
   Claopodium crispifolium (occasionally).
   Dendroalsia abietina (occasionally).
   Dicranoweisia cirrhata (occasionally).
   Dicranum scoparium (occasionally).
   Distichium capillaceum (crevices).
   Drepanocladus uncinatus (occasionally).
   Encalypta ciliata (crevices).
   Eurhynchium stokesii (occasionally).
   Grimmia apocarpa.
   Grimmia pulvinata.
   Hedwigia ciliata.
   Heterocladium heteropteroides (occasionally).
   Homalothecium lutescens (occasionally).
   Homalothecium nuttallii (occasionally).
   Hylocomium splendens (infrequently).
   Hypnum circinale (infrequently).
   Hypnum subimponens (infrequently).
   Isothecium spiculiferum.
   Kiæria starkei.

Mnium glabrescens (infrequently).
Neckera menziesii (occasionally).
Pleurozium schreberi (occasionally).
Rhacomitrium canescens.
Rhacomitrium heterostichum.
Rhacomitrium languinosum.
Rhytidiadelphus triquetrus (occasionally).
Rhytidium rugosum.
Tortula muralis.
Tortula princeps.

2. Growing on rock surfaces subject to splash or seepage:—

Aulacomnium palustre (occasionally).
Blindia acuta.
Bryum miniatum.
Cratoneuron filicinum.
Dichodontium flavescens.
Fissidens adianthoides.
Fontinalis antipyretica (submerged).
Hygrohypnum luridum.
Philonotis fontana.
Rhacomitrium aciculare.
Rhytidiadelphus squarrosus (occasionally).
Scleropodium obtusifolium.
Scouleria aquatica.

Among the habitats frequented by these mosses are the boulders and cliff bases banking rapid streams and rivers as well as cliff faces subject to perennial wash by ephemeral or permanent seepage.

3. Growing in dry sunny exposed sites, usually on earth:—

Abietinella abietina.
Aulacomnium androgynum.
Barbula cylindrica.
Bryum argenteum.
Bryum capillare.
Ceratodon purpureus.
Distichium capillaceum.
Ditrichum heteromallum.

Funaria hygrometrica.
Leptobryum pyriforme.
Oligotrichum aligerum.
Pleurozium schreberi.
Pohlia camptotrachela.
Pohlia nutans.
Polytrichum commune.
Polytrichum juniperinum.
Polytrichum piliferum.
Rhytidiadelphus triquetrus.
Rhytidium rugosum.

4. Growing on shaded forest floor, most commonly in rather dark coniferous forest:—

Abietinella abietina (relatively dry).
Brachythecium asperrimum.
Dicranella heteromalla (along trails).
Dicranum fuscescens (on stumps or logs).
Dicranum scoparium.
Dicranum strictum (on logs or trees).
Drepanocladus uncinatus.
Eurhynchium oreganum.
Eurhynchium stokesii.
Hylocomium splendens.
Hypnum circinale (on logs).
Hypnum subimponens.
Isothecium stoloniferum (logs or rocks).
Leptobryum pyriforme (on raw earth).
Mnium glabrescens (rotten logs).
Mnium insigne.
Mnium spinulosum (logs and tree bases).
Oncophorus wahlenbergii (logs).
Plagiothecium denticulatum.
Plagiothecium elegans (raw earth).
Plagiothecium undulatum.
Pleurozium schreberi.
Pogonatum contortum (raw earth).
Pogonatum macounii.

Pohlia nutans.
Polytrichum commune.
Polytrichum juniperinum.
Ptilium crista-castrensis.
Rhytidiadelphus loreus.
Rhytidiadelphus triquetrus.
Rhytidiopsis robusta.
Rhytidium rugosum (dry).
Tetraphis pellucida (rotten logs).
Timmia austriaca.

5. A number of mosses are very common in wet or swampy areas in the forest:—

Amblystegium serpens.
Aulacomnium palustre.
Brachythecium asperrimum.
Calliergon giganteum.
Dichodontium flavescens.
Eurhynchium stokesii.
Fontinalis antipyretica.
Hookeria lucens.
Leucolepis menziesii.
Mnium glabrescens.
Mnium insigne.
Philonotis fontana.
Pohlia wahlenbergii.
Polytrichum commune.
Rhytidiadelphus squarrosus.
Sphagnum palustre.
Sphagnum squarrosum.

6. Some mosses are most frequent on disturbed earth banks, either along trails or roadsides or sometimes sandy or silty cliffs:—

Atrichum selwynii.
Brachythecium asperrimum.
Ceratodon purpureus.
Dichodontium flavescens.
Dicranella heteromalla.

Dicranella rufescens.
Ditrichum heteromallum.
Eurhynchium stokesii.
Fissidens limbatus.
Funaria hygrometrica.
Leptobryum pyriforme.
Oligotrichum aligerum.
Philonotis fontana.
Plagiothecium elegans.
Pogonatum contortum.
Pohlia camptotrachela.
Pohlia wahlenbergii.
Rhacomitrium canescens.

7. A number of mosses, including many of those mentioned earlier, are common garden weeds, growing on the soil of shaded sites, among the rocks of rock gardens, and on soil left free from cultivation for a period of a few months (near the edge of flower beds, for example):—

Atrichum selwynii.
Brachythecium asperrimum.
Bryum argenteum.
Ceratodon purpurens.
Dicranella heteromalla.
Ditrichum heteromallum.
Eurhynchium stokesii.
Funaria hygrometrica.
Leptobryum pyriforme.
Pohlia camptotrachela.
Pohlia nutans.
Polytrichum commune.
Polytrichum juniperinum.

8. Lawns often are overtaken by mosses, particularly in patches that are shaded and consequently humid during the winter season. Lawns that have acidic soils that are relatively nutrient-poor are also favourable habitats for mosses. If one simply adds ferrous aluminum sulphate (fertilizer grade) at the rate of about 1 pound

per 100 square feet, it is usually sufficient to destroy the mosses in the lawn and fertilize the lawn as well. This chemical is relatively inexpensive and no special " moss killers " are necessary. Probably the most weedy mosses are *Rhytidiadelphus squarrosus* and a species of *Brachythecium*. These mosses often take over immense tracts of lawn both near houses and in golf courses. Other common lawn mosses are:—

Eurhynchium stokesii.
Mnium insigne.
Plagiothecium denticulatum.
Plagiothecium elegans.
Polytrichum commune.
Polytrichum juniperinum.
Polytrichum piliferum.
Rhacomitrium canescens.
Rhytidiadelphus loreus.
Rhytidiadelphus triquetrus.

Another moss, rare in North America and probably inadvertently introduced from Europe, is locally abundant in some lawns in Vancouver, British Columbia, and also Seattle, Washington—*Pseudoscleropodium purum*; it resembles *Pleurozium schreberi*, discussed in this booklet.

9. The mortar between bricks and stones of walls, forming the stucco on buildings, or the concrete retaining-walls and sidewalks have a number of mosses that commonly grow there:—

Barbula cylindrica.
Bryum capillare.
Bryum argenteum.
Ceratodon purpurens.
Grimmia apocarpa.
Grimmia pulvinata.
Rhacomitrium canescens.
Rhacomitrium heterostichum.
Tortula muralis.
Tortula princeps.

10. Several mosses are commonest as epiphytes of tree trunks. *Dicranoweisia cirrhata,* for example, is a very common moss on street trees, often forming rich green turfs on the bark and being fertilized by road dust and rain washing from the tree trunk. Other epiphytic mosses are:—

Amblystegium serpens (often up bases of trees).
Antitrichia curtipendula.
Claopodium crispifolium.
Dendroalsia abietina.
Dicranum fuscescens.
Dicranum strictum (occasionally).
Drepanocladus uncinatus (occasionally up tree bases).
Eurhynchium oreganum.
Eurhynchium stokesii.
Heterocladium heteropteroides.
Homalothecium fulgescens.
Homalothecium nuttallii.
Hylocomium splendens (rarely).
Hypnum circinale.
Hypnum subimponens.
Isothecium spiculiferum.
Leucolepis menziesii (occasionally).
Mnium glabrescens (occasionally).
Mnium insigne.
Mnium spinulosum.
Neckera menziesii.
Orthotrichum lyellii.
Plagiothecium undulatum.
Pogonatum macounii (rarely).
Pohlia cruda (occasionally).
Rhacomitrium lanuginosum (rarely).
Rhytidiadelphus triquetrus.
Tortella tortuosa.
Tortula princeps.
Ulota obtusiuscula.

Most of these mosses are not restricted to the epiphytic habitat, but they commonly occur there.

CRITICAL DETERMINATION OF MOSSES

A student of mosses determines specimens using a compound microscope for detailed examination and a lower-powered dissecting microscope for both dissection and observation of gross structures. For careful study of mosses there are two other vital tools—a collection of accurately determined dried specimens (herbarium) and a library.

The easiest way to obtain the herbarium is by collection of specimens and determining them. To become confident that the specimens are accurately determined, the student compares his specimen with an accurately named specimen in a herbarium, such as that at the University of British Columbia, the University of Calgary, the National Museum of Canada, Ottawa, or the University of Washington, Seattle. As mentioned earlier, single specimens can also be sent to professional bryologists for an opinion at any of these institutions. It is wise to write the expert asking whether he is willing to make such judgments before sending him specimens. Most bryologists are willing, but if their schedule is so occupied with other duties, they sometimes must reluctantly refuse to examine specimens sent in.

The acquisition of the library is rather more complicated and can be rather costly. The most useful volumes are those published by A. J. Grout:—

Mosses with a Hand-lens and Microscope (1903). Although this treats largely Eastern North American mosses, it is essential, particularly for the numerous illustrations.

Moss Flora of North America (1928–39). Three volumes, treating all mosses known in North America up to that time.

Besides these volumes a student should have access to a full set of the journal of The American Bryological Society, *The Bryologist.* Any interested student can join the society and receive the journal ($8 per annum; the journal is issued quarterly) simply by writing the Secretary-Treasurer, American Bryological Society, Southwest Missouri State College, Springfield, Mo. 65802. The journal discusses and illustrates most mosses newly discovered in the country. There are also careful studies and re-evaluations of moss genera and species and many other articles of interest.

Two important studies of North American mosses are currently being written. For British Columbia the ultimate publication of Dr. Elva Lawton's book concerning mosses of North-western United States will be most significant. Dr. Lawton has restudied, described, and newly illustrated all species for her study area. The book will be a vital one for anyone seriously interested in mosses of Western North America. The second publication will be L. E. Anderson and H. A. Crum's *Moss Flora of Eastern North America*. This will also include elegant illustrations of all species in that region, newly described, and keys for identification. This publication, when it appears, will treat a high proportion of the mosses known from British Columbia and will be a vital part of the library of any serious student.

Dr. H. S. Conard's little book *How to Know the Mosses and Liverworts* is also most useful (Wm. C. Brown Company, 135 South Locust Street, Dubuque, Iowa 52003). It is necessary to have a compound microscope for use of this book. It is probably the best inexpensive guide to mosses of North America.

NAMES OF MOSSES

Most mosses do not have popular names in English. In consequence the only name available is the scientific name, always in Latin or latinized Greek, the classical languages of science.

In the present booklet, only the genus and species are given. Occasionally several species are described from the same genus. Thus *Polytrichum* is the genus for the common " hair cap " mosses. If several species of a genus are discussed in a single paragraph, in which the name of the genus is clearly understood, the genus can be abbreviated by the first letter of its name; for example, three species of *Polytrichum* are treated in this booklet—*P. commune*, *P. juniperinum*, and *P. piliferum*. The abbreviated names of the author who first described the species are also part of the complete scientific name. If an author's name is in parentheses it means that the author treated that species as belonging to another genus (or perhaps as a variation of a species). The author whose name follows the parentheses is the one who transferred the species to the genus that it is credited to by the scientific name. (Example: *Leucolepis menziesii* (Hook.) Steere. Hooker in 1829 described this moss as *Bryum menziesii* Hook. In 1950 Steere, in a publication of L. Koch, transferred the name to the genus *Leucolepis*, and the full name would be *Leucolepis menziesii* (Hook.) Steere.)

Those common English names that do exist for mosses usually refer to one or several genera. Thus the " hair cap " mosses include all species of *Polytrichum* and *Pogonatum*, the " feather " mosses include many genera, among them *Ptilium*, *Hylocomium*, *Pleurozium*, and many others. Peat mosses include all species of the genus *Sphagnum*.

Whenever a moss new to science is discovered, the scientist must describe it carefully in Latin and, normally, provide an accurate illustration. This description and illustration must be published in a scientific journal. In order to gain wide acceptance, the new species should be accompanied by a detailed discussion noting the relationships of the species and including clear reasons why the author considers the species a valid one. Unfortunately many thousands of new species of mosses have been described without careful discussions and illustrations to accompany the frequently inadequate description. This means that it is often difficult to discover exactly what is meant by the author of a new species.

Fortunately the specimen used by the author to describe his new species is usually kept in a herbarium. This type specimen is extremely valuable, serving as the only source of clarifying the nature of some described species. If the type specimen is lost, as is too often the case, the name of some described species are treated as synonyms of species already described.

Scientific names are descriptive. The name may be constructed to honour a person or to describe the organism. *Distichium capillaceum*, for example, states that the leaves are in two ranks and are hair-like; *Atrichum selwynii* notes that the calyptra is hairless and that the name honours the noted Canadian geologist A. C. Selwyn.

MOSS GARDENS

The Japanese have constructed beautiful gardens in which mosses are carefully cultured for ornamental purposes. Japanese gardens endeavour to re-create those aspects of nature that exhilirate and inspire man, thus each component that gives a natural vegetation its restful beauty is placed in the garden so that its beauty is exhibited to best advantage.

Since many mosses invade gardens in coastal British Columbia, attempts to encourage them to occupy given portions of a garden can add considerably to the beauty of a garden. The gardner can enhance the beauty of shaded humid areas by introducing moss-covered boulders. If these boulders are of an attractive shape and the mosses are colourful, they can become objects of great beauty.

Moss carpets must also be tended carefully to be of great attractiveness. A mixture of lawn grass and moss is usually very unsightly. A gardener who uses mosses in his garden is likely to select the most attractive available mosses. These must be chosen as carefully as any other garden plant and their environmental requirements must be satisfied in the garden. The best way of satisfying these requirements is to understand the environment in which the moss grows in nature and to re-create that environment in the garden. The process is likely to be one of trial and error, but the resulting garden could be most rewarding. It should be noted that such gardens are likely to require as much care as a flower garden. The problem of invading plants can be particularly hazardous for mosses.

USES OF MOSSES

Sphagnum (peat moss) has long been used as insulating material both by native and hardy pioneering people. It traps much air both within the cells and among the plants and is consequently an excellent insulator. Eskimo women have long used dried *Sphagnum* as diaper material.

The use of *Sphagnum* as surgical dressing, particularly during the First World War, initiated pleas for patriotic citizens to collect and dry the appropriate species that were most effective. *Sphagnum* has absorbent qualities superior to cotton (which was difficult to acquire at that time) and has the added feature that it has antibiotic qualities.

Sphagnum peat is the only important commercial use of mosses. The peat, resulting from centuries of accumulated growth of *Sphagnum*, is surface mined and dried. It is then powdered and the product sold as gardening material. Its water-holding and antiseptic qualities make it admirable as a mixture used in seed beds as well as in other aspects of gardening.

Peat has long been used as fuel, particularly in Eastern European countries. The peat is cut into blocks and dried. Peat has been used in some European countries as the fuel to generate power. Other uses of peat have been the extraction of various substances, as packing material (including mattresses), bedding material for animals, as well as a variety of further uses.

Mosses have yielded a number of substances of presumed curative properties. *Sphagnum*'s antibiotic properties have already been discussed; this moss, mixed with fat, has been used as a salve by Eskimos. A number of mosses are sold in Chinese herb shops for their medicinal qualities; the moss is boiled as a tea.

Moss capsules are eaten by various animals, including birds. Some birds consistently use mosses as nesting material.

No mosses are known to be poisonous, but attempts at eating mosses seem to have been rather limited. The food value of gametophytes is rather low in proportion to the bulk consumed. A number of cases of allergy to mosses have been noted.

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The idea for this booklet actually came from John Steuart Erskine, Wolfville, Nova Scotia. It was he who led the author to become fascinated by mosses. My debt to him is incalculable.

USE OF THE HAND-LENS

A relatively inexpensive hand-lens (12× or 15×) can be purchased. Those of Japanese manufacture are entirely satisfactory and are less costly than those manufactured elsewhere. Most university bookstores stock such hand-lenses.

The hand-lens, to be used effectively, should be held relatively close to the eye and the examined object held in the other hand so that light is transmitted through the object then through the lens to the eye. If the hand-lens is held far from the eye, over the examined material, far less detail can be seen.

USE OF THE KEY

The key has been constructed so that most of the species can be determined by gametophytic features. Gametophytes are always available, while sporophytes are seasonal. In spite of this, however, specimens bearing sporophytes can be determined more reliably than those without. In the illustrations those features are given that should be useful in naming a specimen accurately.

In examining leaves, using the hand-lens (12×) to discern whether the leaf has a costa, is pleated, the margins are entire or toothed, etc., it is necessary, for more effective interpretation, to proceed as follows: Leaves should be stripped from the main stem. This is most readily done using forceps, but can be done by scraping the leaves off with a razor blade. Normally the leaves are stripped or scraped downward. The moss should be moist to remove leaves intact. Leaves are then placed in a drop of water on a piece of glass. If light is transmitted through the glass (and thus through the leaves), one can more clearly view features of the leaf. If leaves cannot be easily removed, most details can be observed while the leaf is attached to the shoot, although leaf shape may not be easily discerned, and if the costa is obscure or double, it may not be noticed. The *Alternative Key* is given in case a moss that has an obscure costa is interpreted to have no costa.

It should be noted that features of changes of the leaf shape from moist to dry condition are sometimes given. Freshly collected mosses air-dry rather rapidly, and addition of moisture to a dried moss (usually by submerging it in water for a few minutes) will permit the moss to appear fresh again.

The key is constructed using pairs of contrasting features. If the specimen does not fit one of the pair of features, one proceeds to the number as directed by the second alternative. This process is followed until a name is discovered. Reference to the species that has been keyed out leads to a comparison of the specimen with the illustration and to the discussion. The notes under " Similar species " may guide the student to the correct species if the specimen matches neither the illustration nor the description. One should be particularly careful in following the correct alternative in each pair of choices; a wrong choice can lead to an entirely unrelated species. To ensure that no mistake has been made, it is often wise to key the specimen out twice to discover whether the same name results each time. If the specimen answers both description and illustration, the specimen is determined.

It should be emphasized, however, that less than 20 per cent of the mosses known in the Province (there are more than 550 species) are treated in this booklet. Many species not included in the booklet strongly resemble those that are. In consequence, it is possible to key out such a moss specimen as one of the species treated here. Some of these similar species (not illustrated) are noted under the species that they resemble.

If the specimen remains puzzling, it should be packeted, carefully labelled, and sent to the author of this booklet for identification. Only dried, labelled packets should be sent; moist specimens in plastic bags are subject to decay and are extremely difficult to determine in a half-decayed state. A collector is urged *not* to send large numbers of specimens for an opinion. If such large numbers are sent, they are likely to be neglected due to the time necessary to give them attention. If few specimens are sent each time, a prompt answer is more likely.

KEY TO MOSSES ILLUSTRATED IN THIS BOOKLET

1. Leaves with a single conspicuous costa 2
1. Leaves lacking or with more than one costa 85
(*Or see* Alternative Key, p. 52)

2. Leaves brittle, tips readily breaking off; usually growing in dense tight masses on wood *Dicranum strictum* (p. 116)
2. Leaves not brittle; habit and habitat various 3

3. Plants complanate, somewhat pinnate, leaves undulate; growing on trees or cliffs *Neckera menziesii* (p. 176)
3. Plants of various habit, if pinnate the leaves never undulate 4

4. Leaves in two ranks; leaf bases glossy, the costa extended as a long hair point *Distichium capillaceum* (p. 118)
4. Leaves lacking some of the above features 5

5. Leaves obovate, bluntish, marginal cells forming a conspicuously differentiated entire margin *Mnium glabrescens* (p. 170)
5. Leaves lacking some of the above features 6

6. Plants dendroid; growing in a moist habitat 7
6. Plants not dendroid; habitat various 8

7. Erect stem leaves pale, nearly white, triangular, with sharp marginal teeth *Leucolepis menziesii* (p. 168)
7. Erect stem leaves green, heart-shaped, with entire margin *Climacium dendroides* (p. 98)

8. Leaves in two ranks, each clasping the one above by an extra flap lying on the same plane as the leaf 9
8. Leaves not as above 10

9. Leaves with colourless margin, differing from remainder of leaf; gametophyte minute, not more than 1 cm. tall; growing on earth *Fissidens limbatus* (p. 132)
9. Leaves lacking differentiated margin; gametophyte more than 1–5 cm. tall; growing on damp cliffs, stream or lake margins *Fissidens adianthoides* (p. 130)

10. Leaves with lamellæ on upper surface of costa 11
10. Leaves lacking lamellæ 17

11. Leaves strongly contorted and much twisted when dry 12
11. Leaves not strongly contorted when dry 13

12. Leaves with undulate margins; lamellæ few (2–5) confined to the narrow costa; leaf margin of elongate cells, toothed *Atrichum selwynii* (p. 70)
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13. Leaves with white hair points, extending beyond the lamella-bearing costa *Polytrichum piliferum* (p. 210)
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26. Leaves pleated, the pleats essentially parallel to the leaf margin, strongest near the leaf base 27

26. Leaves not pleated 30

27. Leaves curved, many curving to the same side of the stem; when viewed from above, the leaves appearing plaited on the stem *Drepanocladus uncinatus* (p. 122)

27. Leaves not curved nor appearing plaited on the stem 28

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28. Plants with few rhizoids on main stem, habitat various 29

29. Leaves long triangular to nearly lanceolate; branches emerging nearly at right angles to stem; seta rough; capsule ovate, at right angles to seta *Brachythecium asperrimum* (p. 82)

29. Leaves short-triangular to nearly cordate; branches nearly parallel to main stem; seta smooth; capsule elongate, suberect *Homalothecium lutescens* (p. 146)

30. Leaves essentially spoon-shaped, giving the leafy stem a worm-like appearance; plants of wet or perennially wet rocks *Scleropodium obtusifolium* (p. 234)

30. Leaves not spoon-shaped, plants not as above 31

31. Leaves with white hair points; forming dense carpets; the main stems suberect or tufted 32

31. Leaves lacking such hair points; growth form various 34

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33. Leaf apex toothed; main stem with many short tuft-like branches; yellowish-green when wet, white when dry *Rhacomitrium canescens* (p. 216)
33. Leaf apex entire; branches of irregular lengths, not tuft-like; dark green to greyish when wet or dry *Rhacomitrium heterostichum* (p.)

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34. Plants not as above; habitat various 36

35. Plants glossy, yellow-green; creeping along substrate when dry; entire stem pinnately branched *Homalothecium nuttallii* (p. 148)
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36. Plants regularly pinnate-branched 37
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39. Plants yellow-green, particularly young leaves; branch and stem leaves similar in shape 40
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40. Leaf apex conspicuously curled to one side, often long and whitish; plants not glossy *Claopodium crispifolium* (p. 96)
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42. Leaves distant on stem, leaf margin entire; capsule generally curved when dry and conspicuously constricted below the mouth *Amblystegium serpens* (p. 64)
42. Leaves close on stem, overlapping; leaf margin various; capsule not curved when dry 43

43. Plants glossy, pale green to yellowish, leaves toothed only near apex; costa never forking; operculum conic .... *Isothecium spiculiferum* (p. 160)

43. Plants not glossy, dark green; leaves entire, ovate to short triangular; costa often forking, operculum rostrate .... *Heterocladium heteropteroides* (p. 144)

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45. Plants glossy, yellowish-green; costa not forked; operculum conic 46

45. Plants not glossy, dark green; costa often forked near apex; operculum rostrate .... *Heterocladium heteropteroides* (p. 144)

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46. Leaves close, at least on stem; leaf margin toothed toward apex, costa similar throughout, narrowing gradually to apex .... *Isothecium spiculiferum* (p. 160)

47. Capsules immersed among perichætial leaves; plants reddish-brown; growing on rocks .... *Grimmia apocarpa* (p. 138)

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49. Leaves crisped when dry, not secund or falcate; lanceolate to ligulate; margins never of strongly differentiated cells 50

49. Leaves not crisped when dry or, if crisped, secund or with differentiated margin; shape various 55

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50. Plants not yellow-green 54

51. Capsule spherical when young, grooved and subspherical when mature .... *Bartramia pomiformis* (p. 78)

51. Capsule never spherical 52

52. Capsule strumose, inclined; leaf abruptly narrowed to a point from a broad base .... *Oncophorus wahlenbergii* (p. 180)

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54. Leaf bluntish, margin conspicuously toothed near apex; capsule stout; peristome teeth short, not twisted *Dichodontium pellucidum* (p. 104)

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55. Costa never extending as a hair point 58

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57. Gametophytes 2 or more cm. tall; plants of various substrates 57*a*

57*a*. Plants with hair points abruptly differentiated from body of leaf; peristome with whitish base and strongly corkscrew-twisted teeth *Tortula princeps* (p. 256)

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59. Capsule nearly spherical when mature and moist 60

59. Capsule never nearly spherical 61

60. Leaves cordate; stems often with a tuft of short branches at the apex *Philonotis fontana* (p. 184)

60. Leaves lanceolate; stems never with a tuft of short branches at the apex *Bartramia pomiformis* (p. 78)

61. Gametophytes forming dark-green loose tufts on tree bark; calyptra hairy; capsules with seta barely exserting capsule beyond perichætial leaves *Orthotrichum lyellii* (p. 182)

61. Gametophytes not tufted; rarely epiphytic; seta long 62

62. Capsule obovate, narrowed to mouth; leaves entire; plants of disturbed sites, often on burned sites .... *Funaria hygrometrica* (p. 136)
62. Capsule cylindric, not conspicuously narrowed to mouth; habitat various 63

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63. Rhizoids confined to base of stem; plants glossy and varying in colour; never with gemma-bearing branches 65

64. Capsule curved when mature leaves not toothed, margins incurved .... *Aulacomnium palustre* (p. 74)
64. Capsule not curved when mature; leaves toothed near apex, margins plane .... *Aulacomnium androgynum* (p. 72)

65. Mature capsule abruptly differentiated from seta, parallel grooves deep; seta reddish; operculum conic; leaves without attenuate point .... *Ceratodon purpureus* (p. 94)
65. Mature capsule gradually narrowing to seta; grooves twisted around capsule; seta reddish to yellowish; operculum rostrate; leaves with long attenuate point .... *Dicranella heteromalla* (p. 106)

66. Leaves with bluntish apex, lacking any sharp point; gametophytes dark green or reddish 67
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68. Leaves with few large blunt teeth near the broad apex, not broadened near base; capsule erect on long seta .... *Rhacomitrium aciculare* (p. 214)
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70. Leaf base not decurrent; gametophyte less than 3 cm. tall 71

71. Costa extended as a smooth attenuate point; leaf marginal teeth single, confined to the upper half of the leaf *Bryum capillare* (p. 86)
71. Costa extended as a short toothed point; leaf marginal teeth in pairs, confined to upper two-thirds of leaf *Mnium spinulosum* (p. 174)

72. Capsule on elongate seta; gametophytes erect; habitat various 73
72. Capsule on short seta, nearly hidden by perichætial leaves; plants of rock or concrete *Grimmia apocarpa* (p. 138)

73. Capsule nodding 74
73. Capsule erect, never nodding 80

74. Leaves lanceolate to oval-shaped, never strongly overlapping or lying against the stem 75
74. Leaves ovate, overlapping and lying against the stem 76

75. Leaves yellow-green and entire, costa forming the upper three-quarters of the leaf; capsule with long pear-like neck *Leptobryum pyriforme* (p. 166)
75. Leaves dark green and toothed; costa forming a small portion of the upper part of the leaf; capsule with a short neck or none *Timmia austriaca* (p. 248)

76. Capsule when dry and ripe, shrinking to nearly half its length when moist; often in wet open environments *Pohlia wahlenbergii* (p. 204)
76. Capsule of similar length when wet or dry; rarely in wet environments 77

77. Gametophytes usually less than 1 cm. tall, silvery green; leafy stems often worm-like; leaves entire *Bryum argenteum* (p. 84)
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79. Both erect and nodding capsules present; perichætial leaves conspicuously longer than other leaves; main stem leaves broadly ovate with few teeth in the upper one-eighth of the leaf; costa ending well below apex *Pohlia cruda* (p. 200)
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80. Leaf base with colourless or reddish-brown cells distinctly differentiated 81
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81. Leaves glossy, narrowed from base toward apex; seta often somewhat curved; calyptra small, conic; of wet rocks ..... *Blindia acuta* (p. 80)
81. Leaves not glossy, pale green, broadened above the middle then narrowing to a short point, seta straight; calyptra large, covering the entire capsule, fringed at base; plants of dryish crevices or earth ..... *Encalypta ciliata* (p. 124)

82. Leaves secund, sickle-shaped, glossy; capsules inclined ..... *Kiæria starkei* (p. 164)
82. Leaves never secund or sickle-shaped; glossy or dull; capsules erect 83

83. On disturbed banks; seta reddish; capsule brownish; operculum conic; gemmæ absent 84
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84. Gametophytes green, never reddish-brown, leaves close; capsule elongate, narrowing gradually to mouth, peristome teeth narrow, straight ..... *Ditrichum heteromallum* (p. 120)
84. Gametophytes often reddish-brown; lower leaves distant; capsule stout, expanded toward mouth; peristome teeth short and stout, curled outward when dry ..... *Dicranella rufescens* (p. 108)

85. Gametophytes with a tight cluster of branches at the apex and with lateral clusters of branches on the main stem; plants of wet situations or bogs 86
85. Gametophytes never as above; habitat various 88

86. Branch leaves markedly squarrose ..... *Sphagnum squarrosum* (p. 242)
86. Branch leaves not squarrose 87

87. Leaves spoon-shaped, with margins infolded and apex bluntish; branches swollen, with blunt tips ..... *Sphagnum palustre* (p. 240)
87. Leaves not spoon-shaped, margins plane, and apex ragged; branches not swollen, with attenuate tips ..... *Sphagnum capillaceum* (p. 238)

88. Leaves pleated, at least near base 89
88. Leaves not pleated 92

89. Gametophytes regularly pinnate, feather-like, yellow-green to golden-green; leaves falcate, somewhat secund ..... *Ptilium crista-castrensis* (p. 212)
89. Gametophytes not feather-like, varying in colour; leaves not falcate or secund 90

90. Double costa very apparent; capsule inclined, elongate and somewhat curved 91

90. Costa not obvious, capsule inclined, subspherical; never curved .... *Rhytidiadelphus loreus* (p. 222)

91. Stem tips with leaves curved and clasping each other; leaves with pleats irregular, rugose, large teeth at broad apex; costæ about one-third length of leaf .... *Rhytidiopsis robusta* (p. 228)

91. Stem tips with leaves untidy, sticking out in all directions; leaves with regular pleats, small teeth at acute apex; costæ about two-thirds length of leaf .... *Rhytidiadelphus triquetrus* (p. 226)

92. Costæ three or more, two lateral and one central about one-half length of leaf; usually on trees, occasionally on rock .... *Antitrichia curtipendula* (p. 68)

92. Costæ never more than two, often none; habitat various 93

93. Gametophyte black or dark brown when dry; forming tight tufts less than 1 cm. deep on rock; capsule opening by 4 longitudinal slits .... *Andreæa rupestris* (p. 66)

93. Gametophyte with white hair points on leaves or never black or dark brown when dry; larger than 1 cm. long; capsule opening by operculum 94

94. Perichætial leaves with ciliate margins; capsule immersed among perichætial leaves; gametophyte whitish when dry; on dry exposed rock .... *Hedwigia ciliata* (p. 142)

94. Perichætial leaves without cilia; capsule with long seta; plants yellowish-green to dark green when dry; habitat various 95

95. Gametophyte with all leaves flattened parallel to the surface of the substrate 96

95. Gametophyte not as above 99

96. Leaves markedly undulate; costa double and inconspicuous .... *Plagiothecium undulatum* (p. 190)

96. Leaves not markedly undulate; costa various or none 97

97. Costa none; leaves ovate; leaf cells large, apparent under hand-lens; leaf apex bluntish .... *Hookeria lucens* (p. 150)

97. Costa double or forked; leaves various; leaf cells hardly apparent under hand-lens; leaf apex acute 98

98. Capsule nodding; costa double (obscure at 12×), about one-third length of leaf; plants occasionally with elongate gemmæ on stem .... *Plagiothecium elegans* (p. 188)

98. Capsule erect to inclined, never nodding; costa forked but rarely double; plants lacking gemmæ .... *Plagiothecium denticulatum* (p. 186)

99. Stem leaves much larger than branch leaves and with contorted apex; gametophyte arching from substrate, bi- to tri-pinnate; forming loose carpets .... *Hylocomium splendens* (p. 154)

99. Stem leaves never as above; gametophyte never more than once pinnate, not arching over substrate 100

100. Aquatic; leaves boat-shaped; alar cells larger and apparent under hand-lens; leaves conspicuously 3-ranked .... *Fontinalis antipyretica* (p. 134)

100. Not aquatic; leaf shape various, not boat-shaped; leaves never conspicuously 3-ranked 101

101. Leaves having a plaited arrangement on the stem, falcate secund 103

101. Leaves never plaited on stem or falcate secund 102

102. Leaves squarrose; differentiated alar region not apparent with hand-lens; gametophyte irregularly branched .... *Rhytidiadelphus squarrosus* (p. 224)

102. Leaves never squarrose, differentiated alar region apparent with hand-lens; gametophyte pinnately branched .... *Pleurozium schreberi* (p. 192)

103. Capsule elongate, suberect; gametophyte regularly pinnate, often strongly curled up when dry .... *Hypnum subimponens* (p. 158)

103. Capsule short and stout, strongly inclined when mature; gametophyte irregularly to regularly pinnate, not strongly curled up when dry 104

104. Costa forked and usually apparent; leaf apex bluntish and toothed; alar regions not apparent with hand-lens, nor cordate; plants of wet rock .... *Hygrohypnum luridum* (p. 152)

104. Costa short and double and inconspicuous; toothed leaf apex long and narrow and acute; alar regions usually apparent and brownish with hand-lens, and cordate; habitat various, frequent on wood .... *Hypnum circinale* (p. 156)

ALTERNATIVE KEY

For material in which the leaves appear to lack a costa at 12× magnification.

1. Plants with branches in conspicuous clusters; leaf cells appearing as a conspicuous network at 12× 2

1. Plants never with branches in clusters, if leaf cells appearing as a conspicuous network at 12×, the plants dorsiventrally flattened 4

2. Branch leaves spoon-shaped with apex somewhat rounded .... *Sphagnum palustre* (p. 240)

2. Branch leaves not spoon-shaped; leaf apices sharply pointed 3

3. Branch leaves with apical portion conspicuously bent outward from the stem, giving the branches a bristly appearance *Sphagnum squarrosum* (p. 242)
3. Branch leaves never with apex bent outward from stem, but with apices somewhat overlapping the leaf above *Sphagnum capillaceum* (p. 238)

4. Plants rather small (stems rarely more than 2 cm. long, usually less), dark brown to black, growing on rock *Andreæa rupestris* (p. 66)
4. Plants always more than 2 cm. long, never entirely black or dark brown; substrate various 5

5. Leaves with longitudinal pleats 6
5. Leaves lacking longitudinal pleats 8

6. Plants very closely and regularly pinnate; branches virtually at right angles to stem; leaves conspicuously sickle shaped *Ptilium crista-castrensis* (p. 212)
6. Plants loosely pinnate or irregularly branched; branches inserted at an acute angle to the stem; leaves not sickle-shaped 7

7. Leaves with conspicuous pleats occupying much of the length of the leaf; plants pale yellow-green, shoot apex with leaves divergent and relatively " untidy "; leaf apices flattened, not curved *Rhytidiadelphus triquetrus* (p. 226)
7. Leaves with pleats confined mainly to near the leaf base; plants dull green, relatively neatly oriented on stem; leaf apices curved, the margins often somewhat inrolled *Rhytidiadelphus loreus* (p. 222)

8. Sporophytes generally present, much immersed with seta inconspicuous; perichætial leaves with conspicuous marginal cilia *Hedwigia ciliata* (p. 142)
8. Sporophytes absent, or if present generally with an apparent seta; perichætial leaves never with cilia 9

9. Leaves conspicuously in 3 regular rows, the leaves conspicuously keeled and essentially boat-shaped; plants aquatic *Fontinalis antipyretica* (p. 134)
9. Leaves never in 3 regular rows, never keeled or boat-shaped; plants generally not aquatic 10

10. Leaves generally sickle-shaped, oriented on stem to give the leafy shoots a plaited appearance 11
10. Leaves never sickle-shaped, orientation never as above 13

11. Capsule 3–4 times as long as broad, usually suberect and somewhat curved *Hypnum subimponens* (p. 158)
11. Capsule less than 3 times as long as broad, inclined 12

12. Capsule conspicuously constricted below mouth when dry, possessing a conspicuous swollen neck where it joins the seta *Hygrohypnum luridum* (p. 152)
12. Capsule not constricted below mouth when dry, tapering gradually into the seta without a swollen neck *Hypnum circinale* (p. 156)

13. Plants with leaves flattened conspicuously dorsi-ventrally to the plane of the substrate 14
13. Plants with leaves never flattened dorsi-ventrally to the plane of the substrate 18

14. Leaves undulate 15
14. Leaves not undulate 16

15. Plants regularly pinnate, usually golden-green; leaves never with margins incurved; capsules with inconspicuous seta *Neckera menziesii* (p. 176)
15. Plants irregularly branched, usually pale green; leaves often with margins somewhat incurved; capsules with conspicuous seta *Plagiothecium undulatum* (p. 190)

16. Leaf cells forming a conspicuous network of diamond-shaped cells (at 12×), plants often whitish-green, never glossy, leaf apex obtuse *Hookeria lucens* (p. 150)
16. Leaf cells not conspicuous at 12×; plants never whitish-green, markedly glossy, leaf apex conspicuously pointed 17

17. Leaves usually near 1 mm. long; filiform stem gemmæ often apparent in sterile material; capsule conspicuously nodding *Plagiothecium elegans* (p. 188)
17. Leaves usually 2 mm. long or more; stem-gemmæ absent; capsule suberect, never nodding *Plagiothecium denticulatum* (p. 186)

18. Branching twice to thrice pinnate; stem bearing conspicuous much-branched paraphyllia among the leaves (visible at 12×); stem leaves often with contorted apex *Hylocomium splendens* (p. 154)
18. Branching normally once pinnate or irregular; paraphyllia absent; stem leaves never with contorted apex 19

19. Plants regularly pinnate; leaves spoon-shaped, apex bluntish, imbricate when dry *Pleurozium schreberi* (p. 192)
19. Plants usually irregularly branched; leaves ovate but with long tapering acute point, with apex conspicuously folded back nearly at right angles to the stem, never imbricate *Rhytidiadelphus squarrosus* (p. 224)

GLOSSARY

Acrocarpous—a moss that produces the sporophyte at the apex of the main shoot (*see* p. 11).

acute—referring to the shape of the leaf apex, gradually narrowed to a narrow point.

alar—a region of the leaf at the basal corners (*see* p. 11).

alpine—the elevations on mountains above the limits of forest trees.

annulus—a ring of cells at the apex of a capsule just at the base of the operculum usually elastic and coiling outward from the capsule before the operculum is shed (*see* p. 11).

apophysis—the swollen neck at the base of the capsule (*see* p. 11).

attenuate—with a very long narrowed apex.

bloom—referring to appearance of a surface; bearing a powdery layer so that the surface tends to appear greyish or bluish and not glossy.

bog—marshy land in which water and nutrient is added only from the air and in which there is accumulation of considerable undecomposed organic material, usually very acid.

bordered (in reference to leaves)—leaf margin different in colour and (or) cell shape from rest of leaf (*see* p. 71).

boreal—referring to that portion of the Northern Hemisphere directly south of the Arctic tundra and north of the sub-tropics, thus including much of Canada, Europe, and Northern Asia.

calyptra—a small sheath that covers the young capsule and falls off before the operculum is shed (*see* p. 11).

complanate (leaf orientation)—with the leaves oriented so that the leafy shoot is flattened parallel to the substrate (*see* p. 177).

conic—the shape of a cone.

coniferous—needle-leaved evergreen trees, usually producing cones.

cordate—referring to leaf shape: heart-shaped (*see* p. 63).

cosmopolitan—of very wide geographic distribution.

costa—the midrib of a moss leaf (*see* p. 11).

crisped—referring to leaves which, when dry, become very twisted and contorted.

cucullate—referring to shape of leaf or calyptra: in which the calyptra sheathes only part of the capsule and is slit on the other side; in the leaf, the shape of the scoop portion of a spoon.

cylindric—the shape of a cylinder.

deciduous—referring to leaves: readily breaking off. Deciduous trees lose their leaves during some season, usually winter in temperate climates. In British Columbia most broad-leaved trees are deciduous.

dehisce—a verb referring to the opening of the capsule, either by an operculum or by longitudinal slits.

dendroid—growth form like a small tree: an erect shoot bearing a crown of branches at the apex (see *Climacium dendroides*, p. 99).

disjunct—referring to geographic distribution, a species occuring in very widely separated localities.

divergent (leaf orientation)—leaves that angle outward from the stem, leaving spaces between the leaves.

elliptic—the shape of an ellipse; i.e., a closed curve of oval shape, slightly longer than broad and tapered at each of the ends (*see* p. 67).

endemic—restricted in natural distribution to a limited geographic area.

entire—referring to the edge of the leaf: smooth or without any suggestion of teeth.

epiphragm—the membrane-like covering over the mouth of capsules in *Polytrichum, Pogonatum, Atrichum,* and *Oligotrichum,* exposed when the operculum is shed.

epiphytic—growing on another plant, using that plant as support (e.g., on tree trunk).

excurrent—the costa extending beyond the body of the leaf, often producing a hair point.

exserted—referring to the capsule that is slightly emergent beyond the perichætial leaves.

falcate (leaf shape) — shaped rather like the blade of a sickle (i.e., curved) (*see* p. 123).

fascicle—a cluster of lateral branches in *Sphagnum* arising from a single point on the main stem.

fen—marshy land in which there is seepage of ground-water adding nutrients from below, and in which there is an accumulation of an undecayed organic mat, usually alkaline to neutral.

flagelliferous—producing long slender branches with leaves much smaller than on the rest of the plant.

gemmæ—special vegetative buds or clusters of cells that are deciduous and serve as asexual reproductive structures (*see* p. 11).

glossy—with a somewhat shiny polished surface.

humus—decayed organic material, largely plant remains, producing a characteristic black to dark-brown surface layer, particularly in forest soils.

imbricate (orientation of leaves)—lying close to the stem, pointing toward apex (*see* p. 103).

immersed—referring to capsules: the capsule with the seta so short that the capsule barely emerges from or is sheathed by the perichætial leaves (*see* p. 135).

inclined—leaning over (referring to capsule orientation), the capsule oriented at an obtuse or right angle to the seta (*see* p. 83).

incurved—referring to leaf margins: curved upward and inward.

lamellæ—flaps on the surface of a leaf (see *Polytrichum commune*, p. 207).

lanceolate—shaped like a lance; i.e., long, narrow, and tapering gradually from base (*see* p. 253).

mats—mosses in which the shoots are interwoven and somewhat creeping over the substrate.

montane—on mountains.

nodding—referring to the orientation of the capsule: seta curved to an inverted J-shape at apex and with the capsule hanging downward from the seta apex (*see* p. 85).

obovate—shaped rather like an egg facing with the narrow part downward (*see* p. 175).

ovate—shaped like the outline of an egg (*see* p. 67).

ovoid—egg-shaped (capsule shape).

paraphyllia — small appendages on the stems of some creeping mosses, scattered among the leaf insertions, sometimes branched and green, best viewed in ***Hylocomium splendens***.

perichætia—the short special branch or the apex of a shoot containing the female sex organs and from which the sporophyte arises (*see* p. 11).

perichætial leaves—the leaves that make up the perichætium, often differing in size or structure from other leaves of the same gametophyte.

peristome—the apical opening of the moss capsule through which spores are shed, often ringed by peristome teeth (*see* p. 11).

perigonial—the male plant or branch of the gametophyte, usually with leaves differing from others on the shoot.

plane—referring to leaf margin: flat, neither curved upward nor downward.

pleated—referring to leaves, in which the leaves possess pleats parallel to the margins and costa (*see* p. 227).

pleurocarpous—a moss that produces the sporophyte on a small lateral shoot emerging from the main shoot of the usually creeping gametophyte.

plumose (branching pattern)—with many regular branches in one plane on both sides of the main stem, rather like a feather (see *Ptilium crista-castrensis*, p. 213).

recurved—referring to leaf margin: curved under.

revolute—margins of leaf strongly curled under.

rhizoids—filamentous much-branched strands usually red-brown in colour, generally on the stems of mosses, often fixing the moss to its substrate.

rosette—referring to an apical, somewhat flattened, tuft of leaves at the apex of a shoot, giving the apex the appearance of a flower.

rostrate—referring to the operculum, bearing a distinct narrowed snout (see *Eurhynchium oreganum*, p. 127).

secund (leaf orientation)—leaves that have the points all oriented in the same direction to one side of the shoot (*see* p. 115).

seta—the stalk of the sporophyte (*see* p. 11).

squarrose (leaf orientation)—usually spreading out at right angles to the stem, often with the base somewhat clasping and the leaf tip curved downward (see *Sphagnum squarrosum*, p. 243).

stoloniferous—a moss that consists primarily of erect shoots, but in which there are also creeping shoots; the creeping shoots are said to be stoloniferous.

strumose—referring to an Adam's apple-like lump at the neck of a capsule (see *Oncophorus wahlenbergii*, p. 181).

subalpine—the elevations on mountains just below alpine—the forest distribution controlled by temperature, nature of soil formation, and snow persistence.

suberect—nearly erect, referring to the orientation of a capsule on the seta apex.

subulate (leaf shape)—the shape of an awl; i.e., extremely narrow, consisting primarily of costa (*see* p. 119).

swamp—wet marshy land in which there is usually standing water at or above the soil surface most of the year.

turfs—mosses with the shoots parallel and upright like the pile of a carpet.

undulate — referring to leaves: with wave-like, rather regular, wrinkles running at right angles to the leaf length (see *Neckera menziesii*, p. 177).

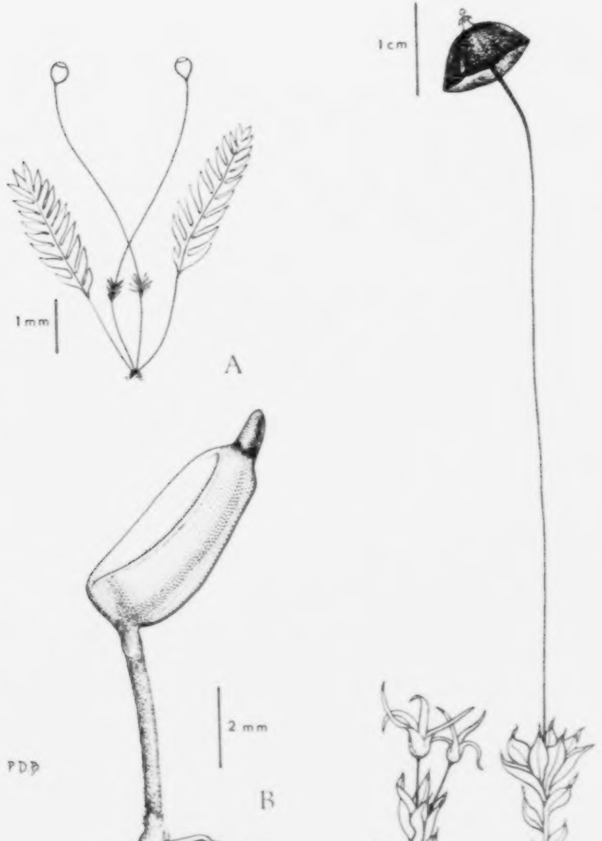
SOME UNCOMMON MOSSES

The three mosses illustrated opposite are not common but are so distinctive that they are likely to fascinate the attention of the novice.

A. *Schistostega pennata* (or " luminous moss ") gives such a startling effect when it glows from caverns and the shaded earth of tree roots that it will undoubtedly attract the interest of a curious amateur. It is discussed in more detail on page 232.

B. *Buxbaumia piperi* (" bug moss ") again elicits curiosity: its shape is unusual, its lack of a leafy green gametophyte, thus the seeming emergence of the sporophyte directly from the substrate will arouse questions in the person who discovers the moss. It is discussed in detail on page 90.

C. *Splachnum rubrum* (" umbrella moss ") is likely to remind a collector of an attenuated mushroom. The brilliant red-purple umbrella will attract the attention of any collector. The gametophyte, however, will immediately inform the collector that the plant is indeed a moss. A detailed discussion appears on page 244.


1 cm
1 mm
A
2 mm
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C

SOME COMMON MOSSES

Abietinella abietina (Hedw.) Fleisch.

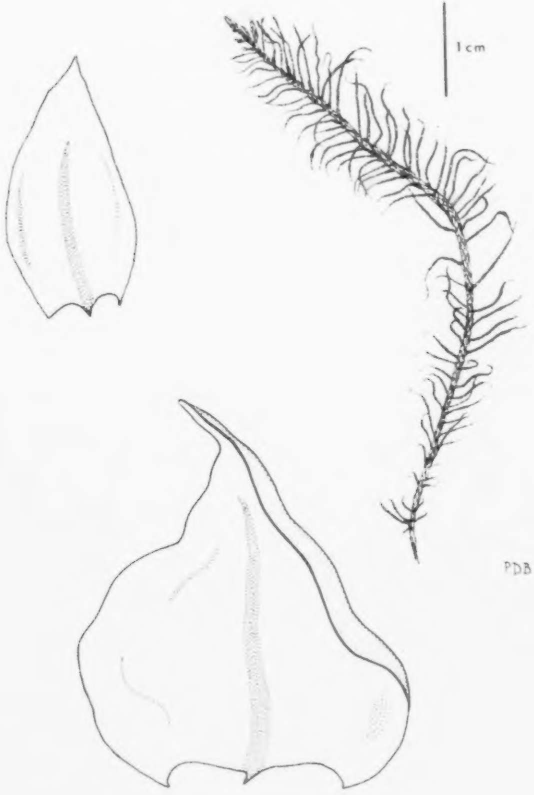
Gametophytes pale yellow-green to rusty brown or even yellowish, not glossy, forming mats of reclining or suberect intertwined plants, sometimes scattered among other mosses. Individual plants 2–10 cm. long or longer, usually regularly pinnate, with the mature branches of nearly equal lengths (5–10 mm. long) tapering and sometimes curved; immature branches and shoot apex bluntish. Stem leaves entire, cordate, 1–1.3 mm. long and 1 mm. wide near base, costa distinct. Branch leaves entire, ovate 0.5–0.8 mm. long and 0.4–0.5 mm. wide near base, costa distinct; both stem and branch leaves normally closely investing the reddish stem. Perichætial leaves rare, colourless to yellowish, 0.8–1 mm. long, enclosing base of seta. Calyptra smooth, cucullate, half-sheathing upper portion of capsule, 1 mm. long, early deciduous.

Sporophytes rare, 2.5 cm. long, including capsule, arising singly from perichætia on the main stem, well below the stem apex. Seta red brown, somewhat twisted when dry, smooth. Capsule curved, more or less cylindric, but often so curved that the capsule itself is hook-shaped, 4 mm. long, including the conic operculum, dark brown, shrunken below the mouth when dry, less than 0.5 mm. in diameter. Peristome yellowish, double. Sporophytes maturing in late summer.

Similar Species.—Very similar in hand-lens features to *Helodium blandowii,* from which it is most readily distinguished by the abundance of rhizoids on the green stem of *H. blandowii* and their absence on the red stem of *Abietinella. Helodium* grows in boggy locations, while *Abietinella* is normally of drier habitats. *Claopodium crispifolium* is also superficially similar. This species is generally fertile, the leaves are toothed and have a white hair point, neither feature being present in *Abietinella.*

Distribution in B.C.—Frequent in northern and eastern B.C., but lacking in the coastal mountains and westward.

Range.—Circumboreal in Eurasia and America; in North America south to montane Virginia in the east and southern British Columbia and montane Arizona in the west.



Abietinella abietina

Amblystegium serpens **(Hedw.) B.S.G.**

Gametophytes dark green, somewhat glossy, forming thin reclining mats of irregularly branched and interwoven plants, the individual plants of which vary from 2–5 cm. long. Branches few, of irregular lengths. Leaves entire, ovate-lanceolate, 0.5–0.7 mm. long, 0.2–0.3 mm. wide near base, the costa obscure at 12× magnification, and not forming an obvious ridge on the back of the leaf. Perichætial leaves colourless, lanceolate, inconspicuous. Calyptra 0.5–0.7 mm. long, smooth, cucullate, half sheathing the upper portion of the capsule, early deciduous.

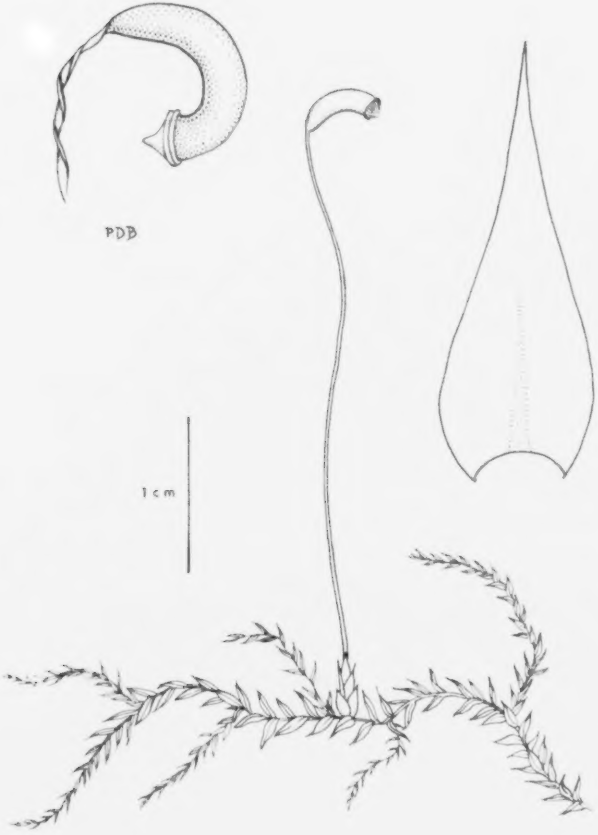
Sporophytes usually numerous, 1–2.5 cm. long, including capsule, arising from perichætia on the main stem of the gametophyte. Seta red brown, somewhat twisted when dry, smooth. Capsule suberect, cylindric, often somewhat curved and hook-shaped, 1–1.5 mm. long, including the short conic operculum, shrunken below the mouth when dry, 0.5 mm. in diameter. Peristome dull brown to yellow, double. Sporophytes maturing in early summer.

Habitat.—Damp wood, particularly on deciduous trees, both on logs and up tree bases, particularly in swampy areas. Occasionally on rock or soil.

Similar Species.—The species cannot be readily distinguished from *Amblystegium juratzkanum* and, on the basis of hand-lens character, could be confused with a number of small pleurocarpous mosses. Because of its small size it is difficult to determine the species with confidence without use of a compound microscope.

Distribution in B.C.—Throughout the Province, particularly wherever wooded swamps are present.

Range. — Cosmopolitan both in the Northern and Southern Hemispheres from the subarctic to the subantarctic.



Amblystegium serpens

Andreæa rupestris Hedw.

Gametophytes black to very dark reddish-brown, forming tight tufts on acid rock. Plants with few irregular branches, varying from 1–5 cm. (usually less than 2 cm.) high. Leaves entire, ovate, usually bluntish, 0.5 mm. long, 0.2 mm. wide near base, lacking a costa. Perichætial leaves apical, black, 0.5–0.7 mm. long, similar to other leaves, but larger, sheathing the naked stem that extends the capsule 1 mm. above the perichætial leaves. Calyptra inconspicuous, rarely seen.

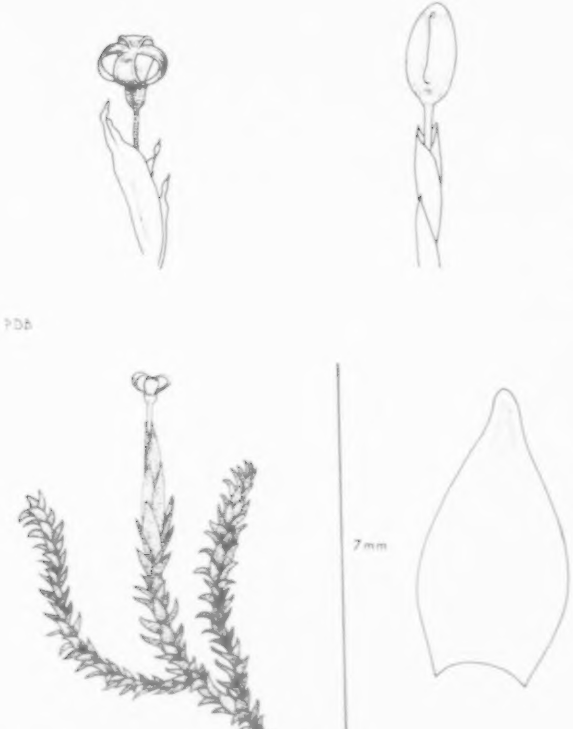
Sporophytes essentially only the elliptic capsule borne at the apex of a seta-like stem, black and inconspicuous, erect, 0.5 mm. long, 0.2 mm. wide when mature, opening by 4 vertical slits which gape open when the capsule shrinks in length upon drying, 1 mm. wide when open. Sporophytes maturing in early spring to summer, dependent on the elevation.

Habitat.—Acid rocks, usually in exposed localities, from near sea-level to alpine areas.

Similar Species.—Other species of *Andreæa* can be readily confused with it. All other species known in B.C. have costate leaves, but this is not obvious at 12×. *A. blyttii* and *A. rothii* are essentially indistinguishable without use of a compound microscope. *A. nivalis* is a much larger species of high elevations, the tufts are often to 10 cm. long, and the plants are soft and pliable rather than brittle as in the other species. When bearing sporophytes, *Andreæa* is unlikely to be confused with any other moss. Hepatics, in which the capsule gapes open by 4 valves, can be distinguished by their possession of a slender colourless seta, often lobed leaves, among other features.

Distribution in B.C.—Probably throughout wherever acid rock is available, thus the species is absent from large portions of the Interior.

Range.—Circumpolar in the Northern Hemisphere, scattered in mountains and subantarctic regions of the Southern Hemisphere.



Andreaea rupestris

Antitrichia curtipendula (Hedw.) Brid.

Gametophytes light green to yellow-green, glossy, forming thick reclining mats or tufts 12–20 cm. long, sometimes longer when festooning branches of trees. Irregular branches 1–1.5 cm. long, tapering or blunt when mature; in humid sites the branches terminated by elongate flagelliform extensions thick with rhizoids. Stem red. Apex of main shoot bluntish, somewhat curved by mainly secund leaves. Leaves mainly entire, with indistinct teeth near the apex, ovate, acute, with recurved margins, 3–4 mm. long, 1–1.3 mm. wide near base, the three costæ indistinct except when examined by transmitted light at 12×, base reddish. Perichætial leaves light green, lanceolate, 2–5 mm. long, sheathing base of seta. Calyptra smooth, 3 mm. long, early deciduous, or obliquely sheathing the operculum.

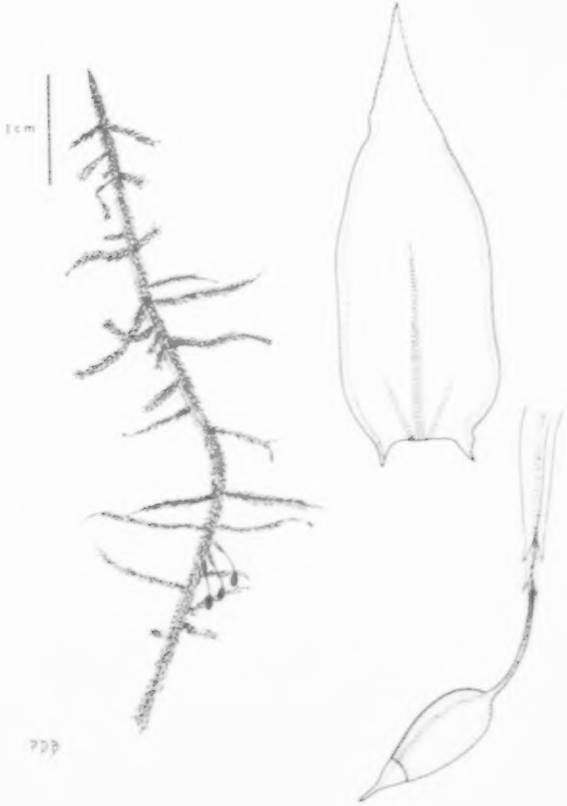
Sporophytes infrequent, 1–1.5 cm. long, including the capsule, arising singly from the sheathing perichætia on the main stem, well below the stem apex. Seta red-brown, slightly twisted when dry, smooth. Capsule 3 mm. long, including operculum, 1 mm. wide, ovate to nearly elliptic, erect, red-brown, operculum conic. Peristome pale brown, inconspicuous. Sporophytes maturing in winter.

Habitat.—Festooning branches and trunks of living trees; on logs and rocks.

Similar Species.—Might be confused with *Antitrichia californica*, from which it differs in the possession of 3 costæ instead of 1, the generally light-green instead of dark-green plants, and the fact that *A. californica* tends to curl conspicuously when dry. *Rhytidiadelphus triquetrus* might be confused with it, but the "untidy" leaves near the stem apex, the cordate leaves, strong double parallel costæ, pleated leaves, and inclined capsule all differ from *Antitrichia*.

Distribution in B.C.—Largely coastal, particularly in humid coastal forests where it festoons trees, particularly deciduous trees, but also found in the Kootenay area in the coniferous forests.

Range.—Western Europe, Western Asia (Caucasus), North-west and North-east Africa, Greenland, Western North America from Alaska to central coastal California, Patagonia.



Antitrichia curtipendula

Atrichum selwynii Aust.

Gametophytes translucent dark to light green, forming colonies of unbranched erect plants usually less than 2–4 cm. tall. Male and female plants generally in separate colonies; the male plants with a crown of broad, brownish leaves; female plants with leaves long and relatively uniform in the upper part. Stem reddish-brown. Leaves 6–10 mm. long, radially arranged, arching outward and upward from the stem; costa obvious, with low lamellæ showing as inconspicuous parallel lines on the upper surface; leaf regularly undulate on the undersurface bearing small teeth on the crests of the undulations; leaf margin toothed, the margin not clearly differentiated (in most specimens) from the remainder of the leaf. Leaves greatly contorted and twisted when dry. Calyptra smooth, obliquely sheathing one side of the capsule and operculum.

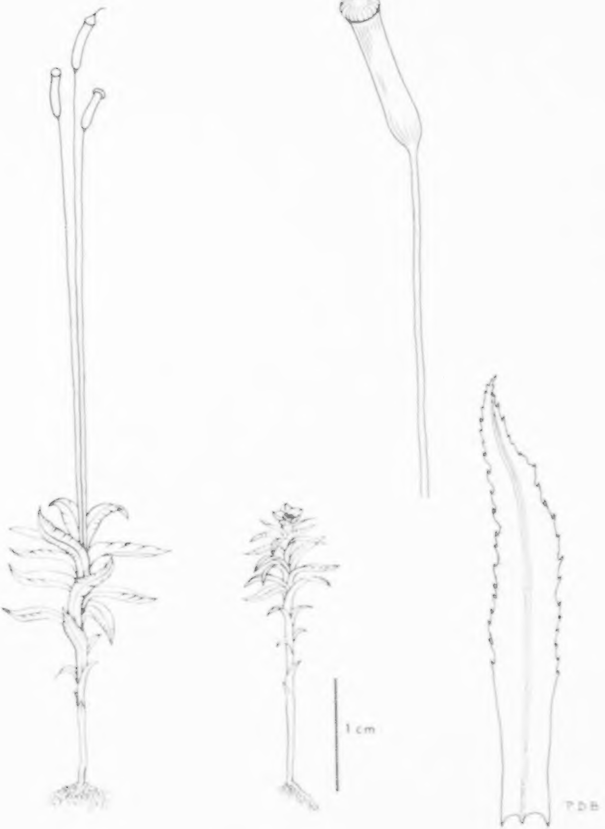
Sporophytes.—3–7 cm. tall, including capsule; seta red-brown, slightly twisted when dry, smooth; capsule 2–4 mm. long, excluding operculum, slightly glossy red-brown to dark brown and slightly broadened at the mouth; operculum long rostrate, nearly as long as the capsule (2–4 mm. long); capsule cylindric, erect to suberect, about 0.5 mm. in diameter, brownish peristome teeth often 0.5 mm. long, arching over the white parchment-like membrane (epiphragm) covering the mouth of the capsule. Sporophytes appearing in late autumn and maturing in early spring, 1–3 per erect gametophyte.

Habitat.—Disturbed inorganic soil, particularly on road and stream banks, overturned tree roots and in flower gardens.

Similar Species.—Can be confused with *Pogonatum contortum*, but the lamellæ on the latter species are far more abundant, occupying much of the leaf, the calyptra is hairy in that species, the capsule short and stout, and gametophytes larger. Can also be confused with *Atrichum undulatum*, from which it is not readily distinguished without microscopic examination. *Oligotrichum parallelum* is also superficially like this species, the distinctions being largely best determined microscopically; the capsule of *Oligotrichum* is pale green rather than dark brown.

Distribution in B.C.—Probably throughout coastal B.C., also in the moister forests in south-eastern B.C.

Range.—A Western North American endemic, west of the Rocky Mountains, California northward to Alaska.



Atrichum selwynii

Aulacomnium androgynum (Hedw.) Schwaegr.

Gametophytes yellow-green, not glossy, forming turfs of erect plants 1–5 cm. deep, the living green portion generally less than 1 cm., branches few, irregular. Stem green, matted with red rhizoids among the leaf bases. Leaves toothed near apex but appearing entire at 12×, lanceolate to ovate lanceolate, 1–2 mm. long, 0.5–0.6 mm. wide, crisped when dry, acute, costa distinct as a pale-green ridge on the back of the leaf, base of costa often reddish. Perichætial leaves similar to other leaves, 2 mm. long, not clasping the base of the seta. Calyptra smooth, cucullate, early deciduous. Flagelliform erect naked branches emergent from some shoots, 2–3 mm. long, bearing spherical masses of dusty green gemmæ at apex of expanded tip; shoot green when young, reddish and seta-like when old, lacking any suggestion of leaves, appearing in early spring, sometimes in autumn.

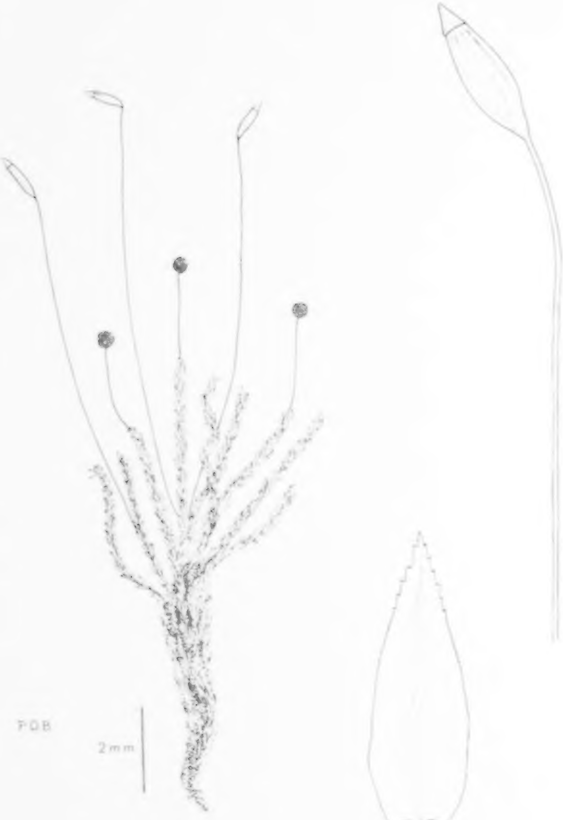
Sporophytes at apex of main shoot. Seta 1.4–2 cm. long, red, somewhat twisted when dry, smooth. Capsule brown, inclined to suberect, cylindric, 2 mm. long, including conic operculum, strongly grooved longitudinally. Peristome whitish to yellow, not spreading outward when dry. Sporophytes maturing late spring.

Habitat.—Rotten logs, particularly of conifers, sometimes on humus or mineral soil, generally in coniferous forest.

Similar Species.—Might be confused with *Tetraphis pellucida* (note discussion under that species) or with *Aulacomnium palustre*, but this species is much larger, the habitat differs, the general character of the leaf is different (refer to that species). *Ceratodon purpureus* might be confused with this species; the capsule, however, has less regular grooves, is a deeper red-purple, and the peristome teeth are red; the gametophyte of this species is generally dark green.

Distribution in B.C.—Probably throughout, but commonest in the more humid coniferous forest.

Range.—Circumboreal in the Northern Hemisphere; southern South America.



Aulacomnium androgynum

Aulacomnium palustre (Hedw.) Schwaegr.

Gametophytes yellow-green, not glossy, forming turfs of erect plants 5–10 cm. deep, the living green portion generally less than 2 cm., branches rare, stems green, matted with red rhizoids among the leaf bases. Leaves with teeth near apex, not clearly visible at 12×, lanceolate to ovate 3–5 mm. long, 1 mm. wide, crisped when dry, acute, costa distinct as a pale-green ridge on the back of the leaf. Perichætial leaves similar to other leaves, not clasping base of seta. Calyptra smooth, cucullate, early deciduous. Flagelliform erect shoots with small leaves near base, emergent from leafy portion 4–5 mm., bearing a small irregular cluster of gemmæ at the apex of the unexpanded tip, green or brownish with age, appearing in spring to autumn.

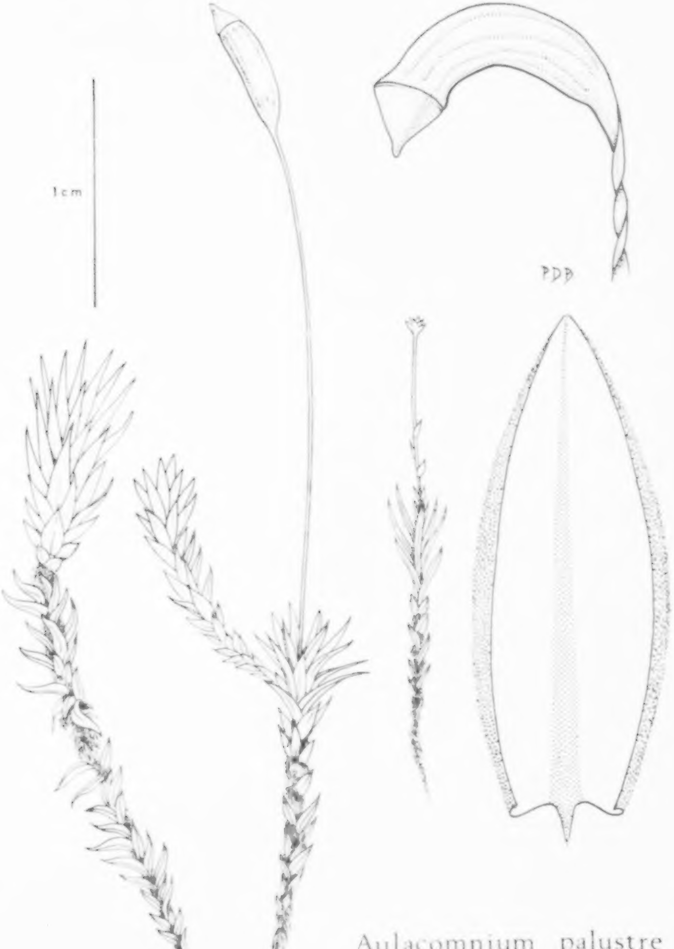
Sporophytes at apex of main shoot. Seta 3–4 cm. long (sometimes longer), strongly twisted when dry, smooth. Capsule red-brown, inclined to suberect, often curved, cylindric, 4 mm. long, including operculum, strongly grooved longitudinally. Peristome yellowish to pale brown, curved inward when dry. Sporophytes maturing in summer.

Habitat.—Boggy, swampy, and seepy areas, occasionally on humus or rotten wood.

Similar Species.—Compare with *A. androgynum;* differences in dimensions and habitat are usually enough to distinguish these species. *A. turgidum,* present in mountains in northern B.C. could be confused with this species, the leaves are blunt rather than acute; it rarely has sporophytes.

Distribution in B.C.—Probably throughout, except in the arid portions of the Interior, and probably in swampy areas there.

Range.—Cosmopolitan in both the Northern and Southern Hemispheres.



Aulacomnium palustre

***Barbula cylindrica* (Tayl.) Schimp.**

Gametophytes dark green to dark reddish-brown, not glossy, forming loose turfs of erect few branched plants 1–1.5 cm. deep; living portion generally less than 0.5 cm. Stem reddish-brown. Leaves entire, lanceolate, 3–5 mm. long, 0.7 mm. wide at base, strongly crisped when dry, costa distinct as a reddish-brown ridge on the back of the leaf. Perichætial leaves similar to others, not clasping the base of the seta. Calyptra cucullate, smooth, early deciduous.

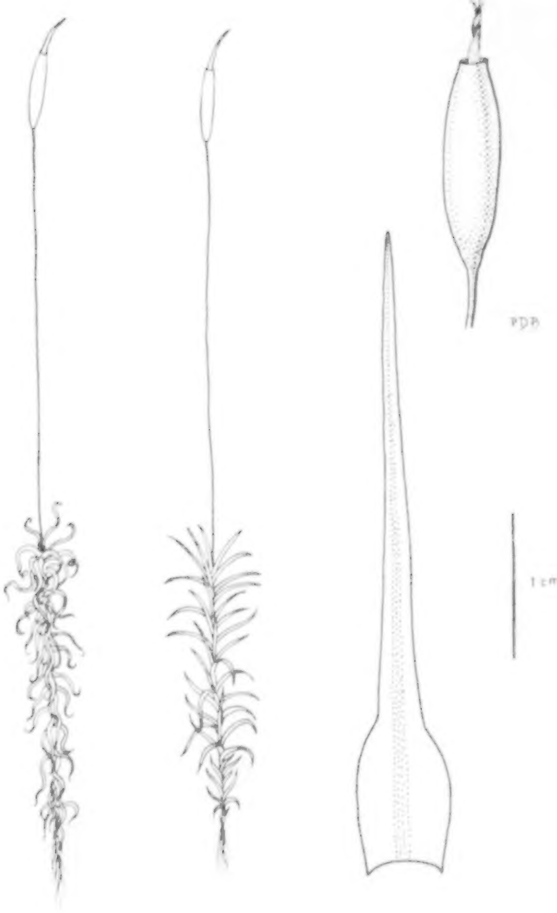
Sporophytes at apex of main shoot. Seta 1.5–2 cm. long, including capsule, red-brown, slightly twisted when dry, smooth. Capsule erect, smooth, cylindric, 1.5–2 mm. long, excluding operculum, 0.5 mm. wide. Operculum conic, 1–1.5 mm. long. Peristome of fine twisted hairs, pale reddish-brown, 1 mm. long. Sporophytes maturing in early summer.

Habitat.—Sunny soil, cliff ledges, often on mortar among bricks or stones of walls, or on cement walls.

Similar Species.—On basis of hand-lens characters can be confused with many species of *Barbula, Didymodon, Bryœrythrophyllum,* and a number of other related genera. It is not easily possible to determine these accurately without careful microscopic study.

Distribution in B.C.—Common in coastal areas, both in the cities and on coastal headlands, also scattered in the southern portion of the Province as far east as the Rockies.

Range.—Circumboreal in the Northern Hemisphere. In North America essentially west of the Rocky Mountains, but a disjunct population in northern Michigan.



Barbula cylindrica

Bartramia pomiformis Hedw.

Gametophytes bluish-green to pale green, rarely dark green, not glossy, except at leaf bases, where they clasp the stem; forming cushions or turfs of erect generally unbranched plants 1–14 cm. deep, the green portion 0.5–3 cm. long. Stem reddish-brown; in the older portion, where the leaves are dead and brown, thickly matted with red-brown rhizoids. Leaves with small marginal teeth visible by transmitted light at 12×, subulate from a broadened base, 3–7 mm. long, 1 mm. wide at base, crisped when dry, costa distinct as a green ridge on the back of the leaf. Perichætial leaves like other leaves, not clasping base of seta. Calyptra cucullate, colourless, smooth, early deciduous.

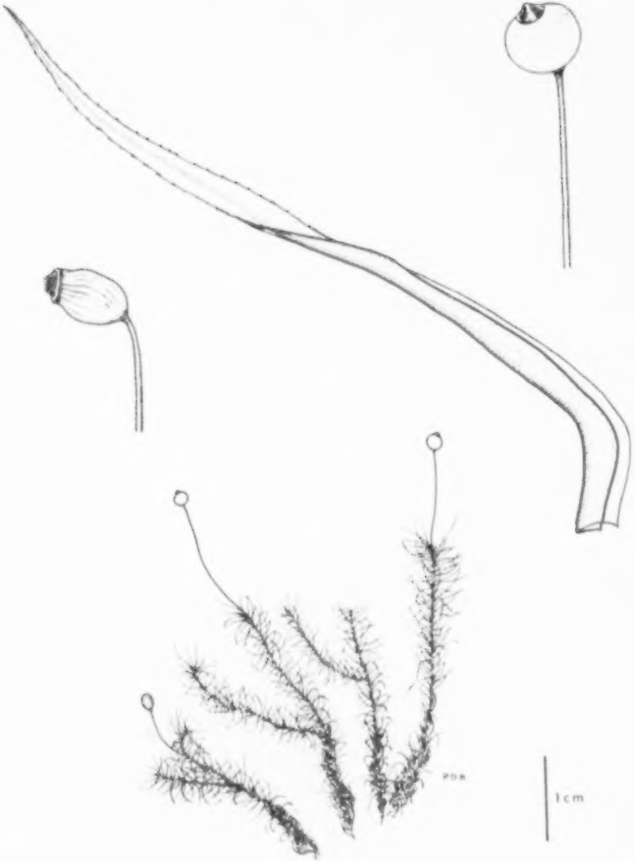
Sporophytes at apex of shoot when young, but appearing lateral as the shoot continues growth after the sporophyte begins growth. Seta 1–2 cm. long, including capsule, red-brown, not twisted when dry, smooth. Capsule erect to suberect when immature, inclined when mature, subspherical and pale green when immature, and ovoid, brown and with regular parallel grooves when mature, 2 mm. long, 1 mm. wide. Operculum short conic, 0.1–0.2 mm. long. Peristome bright red-brown. Sporophytes maturing in spring. Sometimes called " apple moss " because of the fancied resemblence of the young capsule to a shiny apple.

Habitat.—Generally on cliff shelves and in crevices, but sometimes on banks and epiphytic on trees in humid areas.

Similar Species.—*Bartramia ithyphylla* an alpine species, can be confused with *B. pomiformis,* but the leaves of this species are not generally much crisped and the leaf bases are very conspicuously colourless and clasp the stem. *Anacolia menziesii* is also similar, but the capsule of this species is never grooved when mature, the leaves are not greatly broadened near the base, and the leaves are not crisped when dry. Species of *Philonotis* might be confused with this species, on the basis of the very similar sporophyte, but the cordate, smaller leaves, among other features, immediately separate this genus from *Bartramia.*

Distribution in B.C.—probably throughout, except in the arid portions of the Interior.

Range.—Circumpolar, essentially temperate, in the Northern Hemisphere.



Bartramia pomiformis

***Blindia acuta* (Hedw.) B.S.G.**

Gametophytes dark green to rusty green, sometimes black when old; glossy, forming cushions or short turfs of erect, slightly branched plants to 5 cm. deep, but usually less than 1 cm. deep, the green portion usually less than 0.5 cm. long. Leaves lanceolate, 1–1.5 mm. long, 0.5 mm. wide at base, not crisped when dry, entire, costa faintly visible under transmitted light at 12×, not forming a marked ridge on the back of the leaf. Leaf base with well-marked reddish-brown alar areas and base. Perichaetial leaves like others. Calyptra cucullate, smooth, early deciduous.

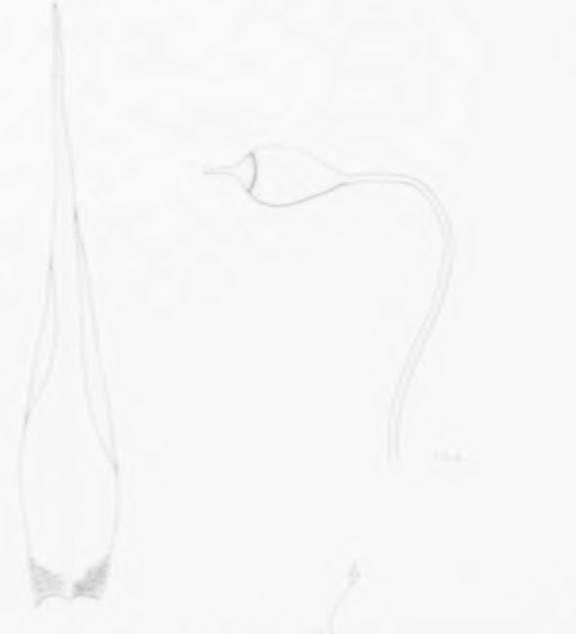
Sporophytes at apex of shoot, sometimes appearing lateral on a short shoot arising from the main shoot. Seta 0.5–1 cm. long, sometimes curved to hide the capsule within the tuft, mainly yellowish, but reddish near base, smooth, twisted when dry. Capsule erect, pear-shaped, brown when young, often black when old, smooth; 0.7–1 mm. long, 0.4–0.5 mm. wide. Operculum rostrate, 0.5 mm. long. Peristome teeth bright red. Sporophytes maturing in late spring.

Habitat.—Damp, usually seepy cliffs or rocks in streams.

Similar Species.—Can be confused with the rare alpine *Arctoa fulvella*. When mature the peristome teeth of *Arctoa* species flare outward while those of *Blindia* do not; other microscopic features readily distinguish these species. Could readily be confused with some species of *Ditrichum*, *Dicranella*, and *Dicranodontium*, from which it is not easily distinguished on hand-lens characters. Could be confused with some species of *Grimmia*, but the leaf shape and glossy leaves should readily separate the *Blindia*.

Distribution in B.C.—Probably throughout, wherever humid cliffs and boulder-filled streams are present.

Range.—Circumpolar, arctic, and temperate portions of the Northern Hemisphere, also in South America and Australia.



Blindia acuta

Brachythecium asperrimum (Mitt.) Sull.

Gametophytes light green, glossy, irregularly branched, forming loose mats of creeping plants 4–8 cm. long, branches 0.7–1 mm. long. Stem green, rhizoids scattered on the underside. Leaves appearing entire at 12×, narrowly cordate, pleated, costa visible by transmitted light at 12×, 2 mm. long 1 mm. wide at base, not crisped when dry. Perichætial leaves lanceolate, yellowish. Calyptra cucullate, smooth, early deciduous.

Sporophytes on short lateral perichætial branch arising well behind the apex of the main shoot. Seta 1–2 cm. long, red-brown, rough, slightly twisted when dry. Capsule brown, suberect or generally inclined, 2 mm. long, 1 mm. wide, ovoid, shrinking below mouth when dry. Operculum conic, 0.4 mm. long. Sporophytes maturing in early spring.

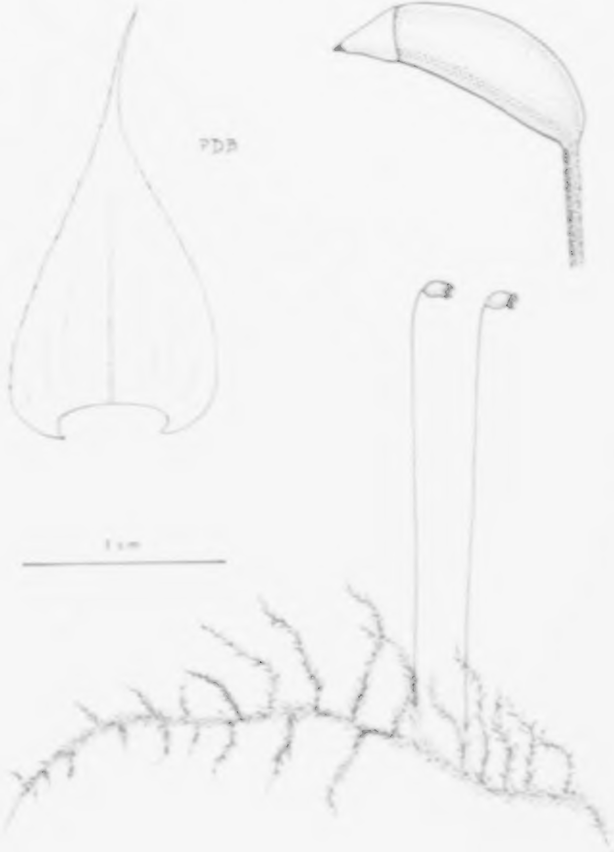
Habitat.—On earth, logs, living trees, and often seepy cliffs.

Similar Species.—Can be readily confused with many species of *Brachythecium*, from which it is distinguished with difficulty even with microscopic study. Some species of *Homalothecium* might be confused with it, but this genus has a more elongate capsule in most cases and a smooth seta. Most species of *Homalothecium* are in drier sites than *Brachythecium*. *Campylium* and *Amblystegium*, which might be confused with *Brachythecium*, also possess smooth setæ, among other features that separate them.

Distribution in B.C.—Largely coastal and associated with mountainous areas. Probably absent in north-eastern and the arid portions of the Province.

Range.—Endemic to Western America, from Alaska southward to mountains in Mexico, eastward to the Rocky Mountains.

Notes.—Now generally treated as *Brachythecium frigidum* (C. Müll.) Fleisch.



Brachythecium asperrimum

***Bryum argenteum* Hedw.**

Gametophytes silvery green to whitish; worm-like, glossy, erect shoots forming short turfs 2–6 mm. high. Stem reddish-brown. Leaves ovate, 0.5–0.8 mm. long, 0.4–0.5 mm. wide at base, entire, costa visible under transmitted light, not crisped when dry. Perichætial leaves like others. Calyptra cucullate, smooth, early deciduous.

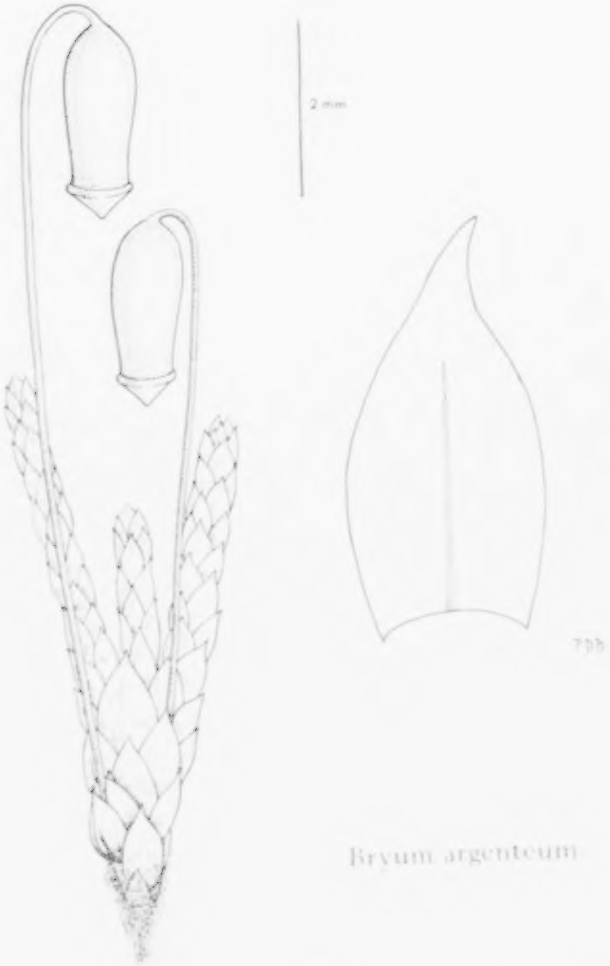
Sporophytes at apex of short shoot, but seemingly on a basal shoot as the lateral branches elongate and sporophyte matures. Seta 1–1.5 mm. long, red, slightly twisted when dry, smooth. Capsule nodding, cylindric, bright red when mature, 1.7–2 mm. long, including operculum, 0.8–1.0 mm. wide. Operculum short conic, 0.1–0.2 mm. long. Peristome pale red-brown, double. Sporophytes maturing winter to early spring.

Habitat.—On exposed earth, frequently on cement, at margins of sidewalks, in rock gardens.

Similar Species.—Might be confused with *Myurella julacea* and *M. sibirica* when these are sterile, but these are never glossy, the shoots taper toward the apex while in *B. argenteum* the apex is bluntish, and the leaves of *Myurella* are cordate rather than ovate. *Plagiobryum zierii* is very similar to *Bryum argenteum* when sterile, and is not readily separated from it on hand-lens features. The leaves of *Plagiobryum* are usually larger, usually more than 1 mm. long, but this feature is not entirely reliable. The sporophyte of *Plagiobryum* is always larger, is never red, possesses a long tapering neck, making it elongate pear-shaped rather than cylindric, features never present in *Bryum argenteum*.

Distribution in B.C.—Probably throughout, particularly near areas of human habitation.

Range.—Cosmopolitan, from the Arctic to Antarctic and present in the tropics, most abundant locally in temperate regions.



Bryum argenteum

Bryum capillare Hedw.

Gametophytes dark green to dark red-brown, glossy, forming loose turfs of erect, generally little-branched plants 1–2 cm. deep, leaves usually forming a rosette near apex of shoot. Stem red-brown, rhizoids numerous but never forming dense matted masses obscuring the stem. Leaves obovate to nearly elliptic, 2–3.5 mm. long, 1.5–2 mm. wide, entire, usually tipped by a hair-like point (often 0.5 mm. long), twisted when dry. Leaf margin of more elongate narrower cells than the bulk of the leaf, frequently dark red like the distinctive costa, that forms a distinct ridge on the back of the leaf. Perichætial leaves like other leaves. Calyptra cucullate, smooth, early deciduous.

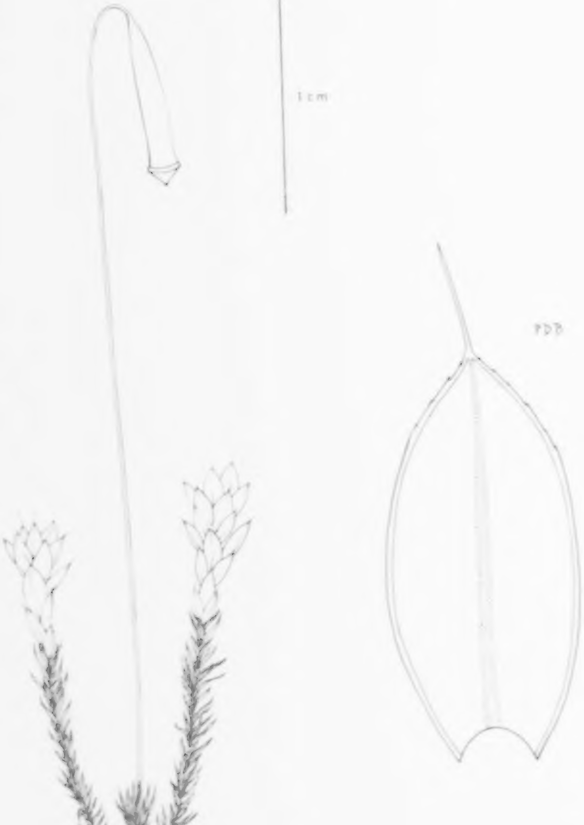
Sporophytes at apex of main shoot when young, but lateral branches frequently arise below the main shoot apex, thus obscuring the base of the mature sporophyte. Seta 3–5 cm. long, smooth, light to dark red-brown, not twisted when dry. Capsule nodding, cylindric, tapering into the seta and sometimes appearing elongate pear-shaped, rusty brown when mature, not glossy except at the mouth, 6 mm. long, 0.8 mm. wide. Operculum short conic, glossy, 1 mm. long, generally darker brown than the remainder of the capsule. Peristome light red-brown, double. Sporophytes maturing in spring.

Habitat.—Open sites, frequent in cliff crevices and shelves, sometimes on earth and logs.

Similar Species.—Can be readily confused with many species of *Bryum*, from which it is not readily distinguished by hand-lens features. *Pohlia nutans* and other species of *Pohlia* might be confused with it, but their lack of differentiated leaf margins and their possession of teeth near the leaf apex generally distinguish them. *Mnium spinulosum* might be confused with this species, but the capsule is never dark brown, does not taper to the seta, the operculum has a distinct snout, the leaves are always green and never possess a hair point.

Distribution in B.C.—Probably throughout except in the more arid regions, and probably locally present there.

Range.—Widespread both in the Northern and Southern Hemispheres.



Bryum capillare

Bryum miniatum Lesq.

Gametophytes dark green, dark red-brown to golden brown, glossy, forming dense tufts or mats of erect, little-branched shoots 1–4 cm. deep, apex of shoot somewhat tapered. Stem red-brown, rhizoids numerous but not forming dense matted masses. Leaves ovate to oblong ovate, 1–2 mm. long, 0.5–1 mm. wide, apex blunt, costa red, forming a distinct ridge on the back of the leaf. Leaves imbricate, not twisted when dry. Perichætial leaves like other leaves. Calyptra cucullate, smooth, early deciduous.

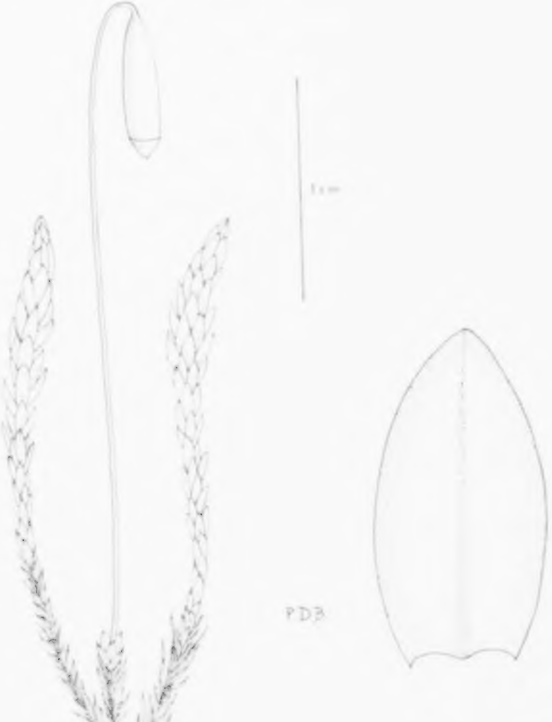
Sporophytes at apex of main shoot when young, but lateral branches usually arising below the main shoot apex, thus obscuring the base of the seta. Seta 2.5–3 cm. long, dark red, smooth, not twisted when dry. Capsule nodding, cylindric to pear-shaped, tapering to the seta, rusty brown to dark red-brown when mature, not glossy; 3–4 mm. long, 1 mm. wide. Operculum conic, 0.5–1 mm. long. Peristome yellow-brown, double. Sporophytes maturing in spring.

Habitat.—Open wet exposed cliffs.

Similar Species.—Can be confused with other species of *Bryum*, but the blunt leaf apices, the dark-green colour, the wet cliff habitat are all features that segregate it from other species.

Distribution in B.C.—Predominantly coastal and montane but also in the humid Interior and Rocky Mountains.

Range.—Western North America from B.C. to California and east to western Montana; disjunct in the Faroes.



Bryum miniatum

Buxbaumia piperi Best.

Gametophyte inconspicuous as a whitish mass at the base of the seta. Calyptra conic, early deciduous, and usually absent when sporophytes are conspicuous.

Sporophyte arising perpendicular to the substrate. Seta red-brown, very rough, stout, 0.7–1 cm. long, not twisted when dry. Capsule obliquely oriented to seta, pale green to olive green, not glossy when mature, ovate with flattened upper surface, 5–7 mm. long, including operculum, 2–3 mm. wide. Operculum conic, red-brown, 1 mm. long. Peristome of reddish outer teeth, flared outward when dry, inner peristome a white pleated cone. Sporophytes maturing in autumn.

Habitat.—Rotten conifer logs in coniferous forest, occasional on earth of subalpine areas.

Similar Species.—*Buxbaumia indusiata* is similar, but the outer layer of the capsule surface curls and peels back when the capsule is ripe. *B. aphylla* tends to be red-brown, broadly ovate to nearly circular when viewed from above and strongly flattened on the surface.

Distribution in B.C.—Coastal forests and also to the Rocky Mountains; largely in the southern part of the Province, known from as far north as the Kitimat area and the Queen Charlotte Islands.

Range.—Endemic to Western North America from B.C. southward to Oregon and eastward to western Montana.

Notes.—Not a common moss, but so unusual that it is likely to be collected if seen. Sometimes called " bug moss."

***Calliergon giganteum (Schimp.)* Kindb.**

Gametophytes dark green or sometimes brownish or reddish-brown, 5–20 cm. long, often more, the living green portion usually 3–7 cm. long, forming glossy mats or, more generally, when colonies dense, masses of perpendicular shoots, the main stem usually upright, pinnately branched, branches 0.5–2 cm. long. Stem green to brown. Stem leaves usually distant, decurrent, divergent, ovate from a cordate base, 4 mm. long, 2 mm. wide near base, the alar cells forming colourless areas; costa apparent but not forming a distinct ridge on the back of the leaf, apex blunt, branch leaves similar to stem leaves, usually smaller, the apex less blunt. Leaves slightly contorted when dry. Perichætial leaves lanceolate, acute, pale green, clasping base of seta. Calyptra smooth, cucullate, early deciduous.

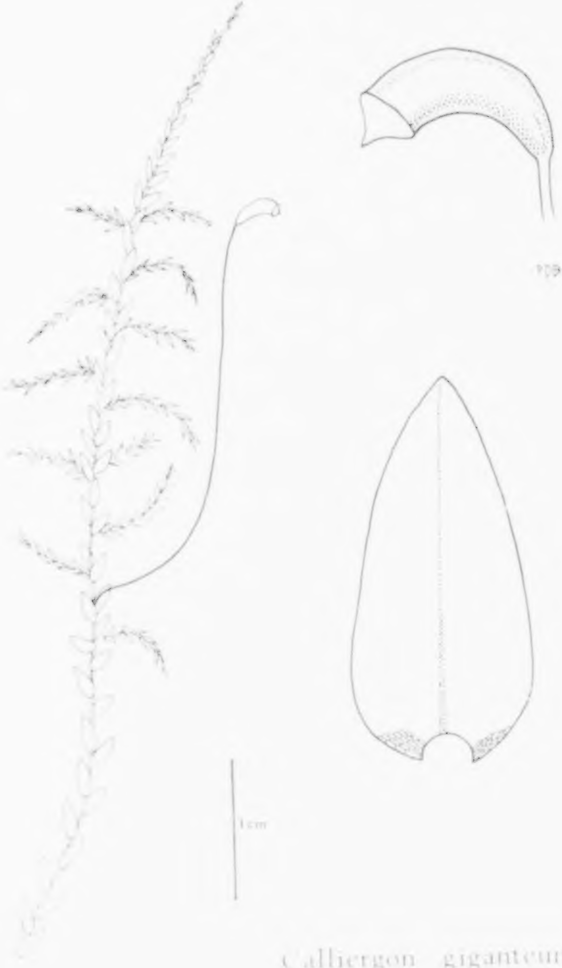
Sporophytes on short lateral perichætial shoot arising from main stem far below the apex of the main stem. Seta red, smooth, 5–7 cm. long, twisted when dry. Capsule curved, like an inverted " J," not glossy, 3 mm. long, 1 mm. wide, shrunken below mouth when dry. Operculum short conic, 0.3–0.5 mm. long. Peristome yellow-brown, double. Sporophytes maturing in summer, infrequent.

Habitat.—In bogs, swamps, and ponds, especially abundant floating in margins of calcareous pools.

Similar Species.—Readily confused with *Calliergon cordifolium*, from which it is not readily distinguished by hand-lens characters. *Calliergonella cuspidata* is also similar, but the double or inconspicuous costæ of this species readily separate it. *Pleurozium schreberi* might be confused with it, but it also has double or obscure costæ, the stem is red, and it grows in dry sites, never in water.

Distribution in B.C.—Few collections exist, but the species is probably frequent in ponds, swamps, and quiet waters of much of the Province, particularly the northern and eastern portions; local near the coast.

Range.—Circumboreal in the Northern Hemisphere.



Calliergon giganteum

Ceratodon purpurens (Hedw.) Brid.

Gametophytes light green to dark green, sometimes dark red-brown, forming dense short turfs of erect plants 0.2–1 cm. deep. Stem red-brown. Leaves ovate-lanceolate to lanceolate, 1–1.5 mm. long, 0.5 mm. wide, divergent when moist, somewhat crisped when dry, costa forming a ridge on the back of the leaf. Leaf margins appearing entire at 12×, but obscure teeth present near the acute apex; margins recurved. Perichætial leaves lanceolate, imbricate to base of seta. Calyptra cucullate, smooth, early deciduous.

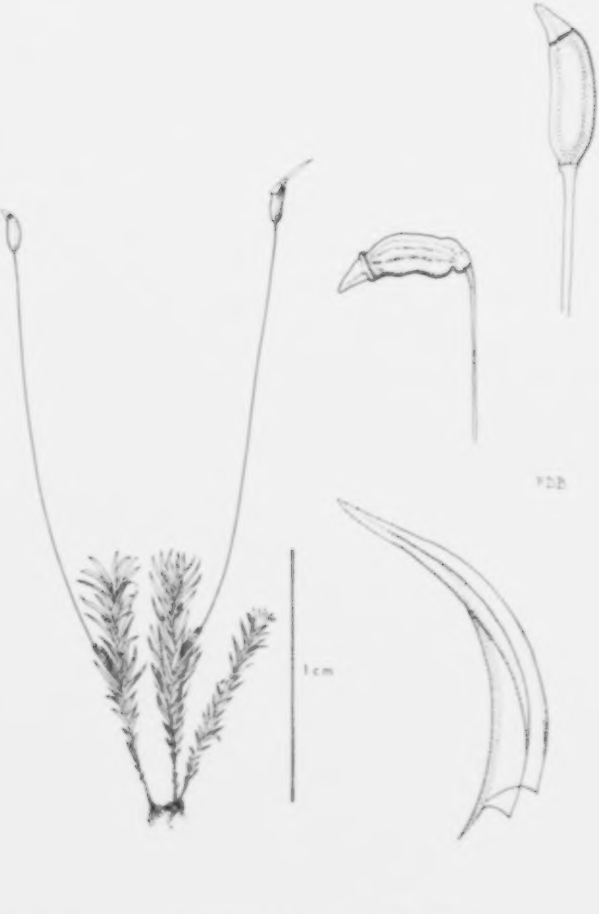
Sporophytes at apex of main shoot, but appearing lateral as lateral shoots arise beneath it and surround the perichætium, thus obscuring it. Seta 2–3 cm. long, dark red, smooth, twisted when dry. Capsule erect and smooth when immature and moist, cylindric, 2–3 mm. long, including conic operculum, 1 mm. wide; operculum 0.5 mm. long. Capsule suberect and grooved when dry, strumose, glossy. Peristome red, teeth incurved when dry. Sporophytes maturing in spring and summer.

Habitat.—Usually sunny sites, on sterile earth, cliff crevices, stone or concrete walls or rotten logs.

Similar Species.—Might be confused with *Aulacomnium androgynum* (note discussion under that species). It might be confused with *Ditrichum heteromallum*, but the leaves of *Ditrichum* are subulate, the capsule is erect and smooth when dry, and the peristome teeth are erect, rather than incurved, when dry. *Barbula* might be confused with *Ceratodon*, but the capsules of *Barbula* are erect, the peristome teeth are long and twisted when dry, among other features.

Distribution in B.C.—Throughout, from sea-level to subalpine areas, from humid oceanic climates to arid regions.

Range.—Widespread in both the Northern and Southern Hemispheres from the high Arctic to Antarctica.



Ceratodon purpureus

Claopodium crispifolium (Hook.) Ren. & Card.

Gametophytes bright yellow-green, sometimes dark green, not glossy, pinnate, creeping, forming mats, 6–8 cm. long, often more, branches 3–6 mm. long. Stem green. Leaves cordate, tapering abruptly to an attenuate hair point, 2 mm. long, 0.7–1 mm. wide at base, crisped when dry, costa forming a somewhat glossy ridge on the back of the leaf. Leaf margins appearing entire under 12× magnification, but possessing numerous small teeth. Perichætial leaves colourless to yellowish, lanceolate, imbricate around base of seta. Calyptra cucullate, smooth, early deciduous.

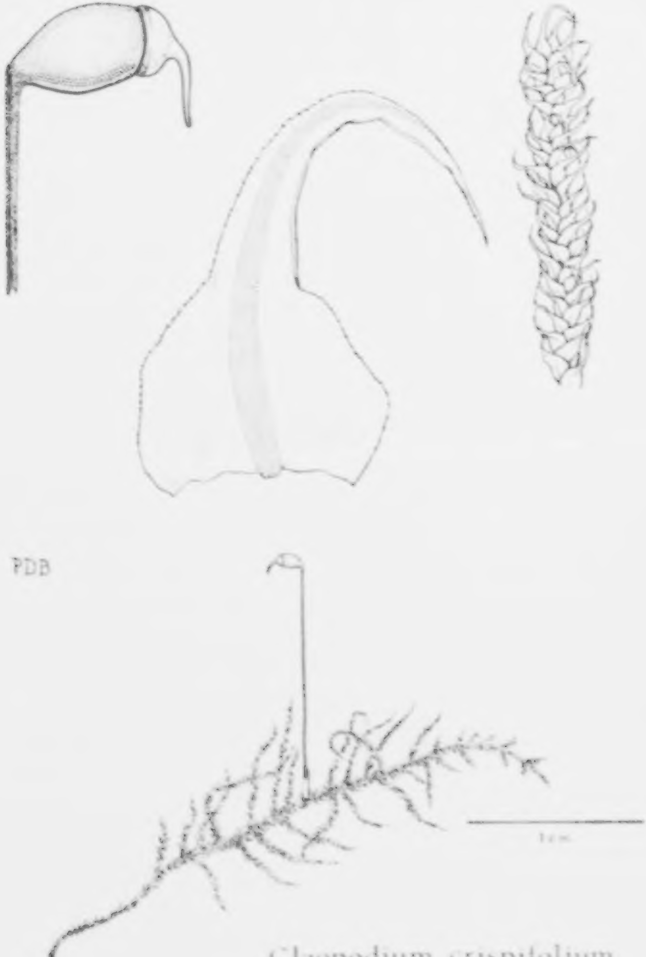
Sporophytes on short lateral perichætial shoot arising on main stem well behind the apex. Seta red, rough, not twisted when dry, 1–2 cm. long. Capsule inclined, not glossy, ovate, 2 mm. long, 1 mm. wide. Operculum strongly rostrate, 1–1.5 mm. long. Peristome yellow, double. Sporophytes maturing in late winter to early spring.

Habitat.—On cliffs, soil, rotten logs or epiphytic on trees, particularly maples.

Similar Species.—Cannot be easily distinguished from *Claopodium bolanderi* on hand-lens features, although *C. bolanderi* is generally smaller. *Heterocladium heteropteroides* might be confused with *Claopodium*, but the *Heterocladium* lacks hair points on the leaves, is much smaller, is not pinnate, is dark green, and the costa is often scant and inconspicuous. Might be confused with *Helodium blandowii*, but this species is of alkaline swamps, has numerous rhizoids on the stem and the seta is smooth, and the operculum conic.

Distribution in B.C.—Primarily coastal in the more humid areas, but also in the humid Interior to the western flanks of the Rocky Mountains.

Range.—Western North America from Alaska to California and inland to western Montana; also in Japan and Amur.



Claopodium crispifolium

Climacium dendroides (Hedw.) Web. & Mohr.

Gametophytes dark green to yellowish-green, glossy, dendroid, forming loose mats of erect plants 3–7 cm. tall, branches 1–2.5 cm. long; the unbranched " trunk " 1–4 cm. tall. Stem red-brown, with imbricate leaves, even when dry. Stem leaves cordate, 4–4.5 mm. long, 2–2.5 mm. wide at base, margin entire. Branch leaves ovate, 2–3 mm. long, 1 mm. wide at base, obscurely to conspicuously toothed near apex; costa apparent in all leaves as a reddish ridge on the back of the leaf. Stoloniferous branches arising at base of unbranched erect shoot, these stoloniferous shoots with abundant rhizoids, the apex ultimately producing an erect dendroid shoot. Perichætial branches among other branches, their leaves lanceolate, colourless or greenish, clasping base of seta. Calyptra cucullate, smooth, early deciduous.

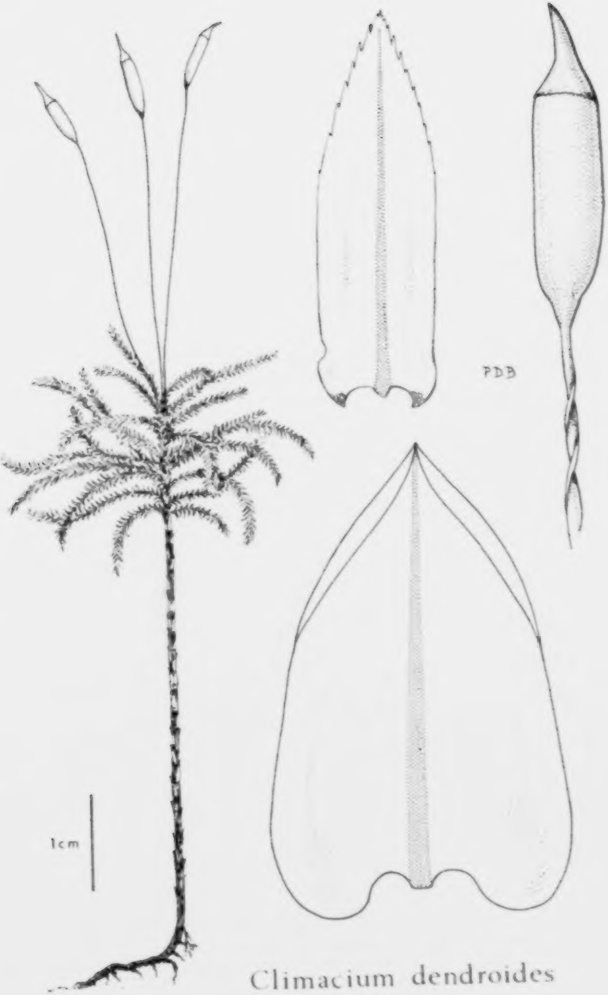
Sporophytes on short perichætial shoots among branches. Seta red, smooth, twisted when dry, 3–4 cm. long. Sporophytes often many on each plant when present. Capsule erect, cylindric, 4 mm. long, including operculum, 1 mm. wide, tapering to seta, red-brown. Operculum conic to rostrate, 1 mm. long, often attached to columella and raised above capsule mouth when spores are shed. Peristome of red-brown teeth; the white columella usually emergent beyond the peristome teeth. Sporophytes maturing in summer.

Habitat.—In swamps and near streams and rivers, on soil or logs.

Similar Species.—Might be confused with *Leucolepis menziesii*, from which it differs by its erect rather than nodding capsule, the entire stem leaves rather than sharply toothed ones, among other features. *Pleuroziopsis ruthenica,* rare in the Province, has the branches very much branched and the whole crown of branches tends to be triangular in outline.

Distribution in B.C.—Probably throughout, local where the habitat is available.

Range.—Circumboreal in the Northern Hemisphere, also in New Zealand.



Climacium dendroides

Cratoneuron filicinum (Hedw.) Spruce

Gametophytes dark green, yellow-green to golden green, somewhat glossy, pinnately branched, creeping to suberect when in dense mats, 4–10 cm. deep. Branches 2–4 mm. long. Stem pale brown to green, often with numerous rhizoids in older portion, leaves not crisped when dry. Leaves cordate, sharply acute, 1.5–2 cm. long, 1 mm. wide at base, entire, alar regions forming decurrent colourless areas near costa; costa brown, forming a ridge on the back of the leaf. Leaves somewhat pleated. Perichætial leaves colourless to yellowish, lanceolate, clasping base of seta. Calyptra smooth, cucullate, early deciduous.

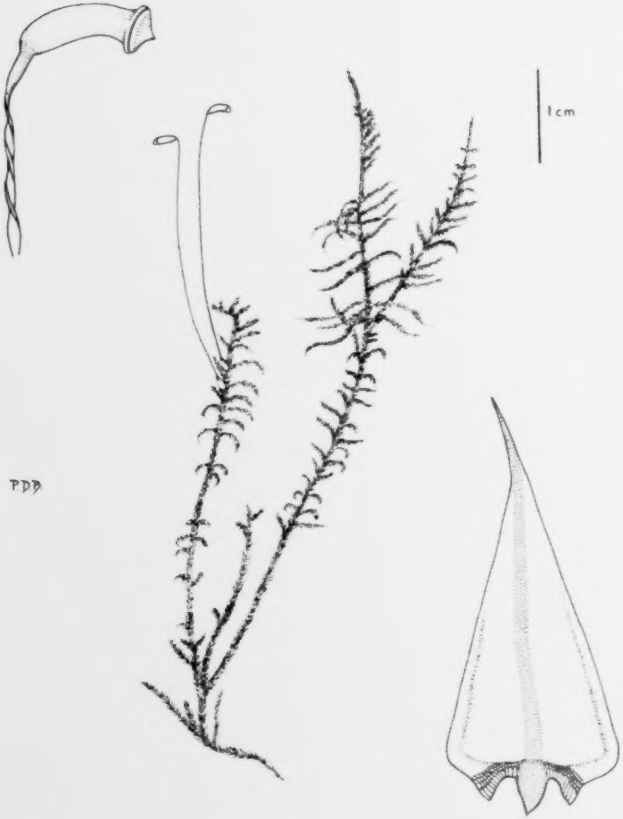
Sporophytes on short lateral perichætial branches arising well behind the main shoot apex and on the main shoot. Seta red, smooth, twisted when dry, 3–3.5 cm. long. Capsule curved, inverted, J-shaped to seta when mature, brown, not glossy, 2 cm. long, 0.5 mm. wide, contracted below mouth when dry. Operculum conic, 0.3–0.5 mm. long. Peristome yellow, double. Sporophytes maturing in summer.

Habitat.—Seepy and swampy areas, particularly in calcareous regions, but not confined to such regions.

Similar Species.—Might be confused with some species of *Drepanocladus,* but the decurrent alar regions, the strongly pinnate branching, and the generally abundant rhizoids are distinguishing features.

Distribution in B.C.—Probably throughout wherever the habitat is available.

Range.—Circumboreal in the Northern Hemisphere and southward to equatorial areas; local in the Southern Hemisphere.



Cratoneuron filicinum

Dendroalsia abietina (Hook.) E. G. Britt.

Gametophytes dark green, not glossy, dendroid and pinnately branched, 1–9 cm. long, the unbranched " trunk " 2–3 cm. long, branches 0.3–1 cm. long, numerous. Plants forming loose masses of suberect plants. Main stems red, branch stems green, rhizoids numerous at base of main stem. Leaves imbricate and not crisped when dry, divergent when moist. Leaves ovate, those of the main stem 3–3.5 mm. long, 1–1.5 mm. wide near base, strongly acute, entire; those of the branches 2 mm. long, 1 mm. wide at base, with obscure teeth at apex; costa forming a ridge on the back of the leaf. Gametophytes remarkably curled when dry, expanding to plume-like plants when moist. Perichætial leaves pale green, sheathing the entire seta. Calyptra cucullate, smooth, persistent until just before dehiscence of the capsule.

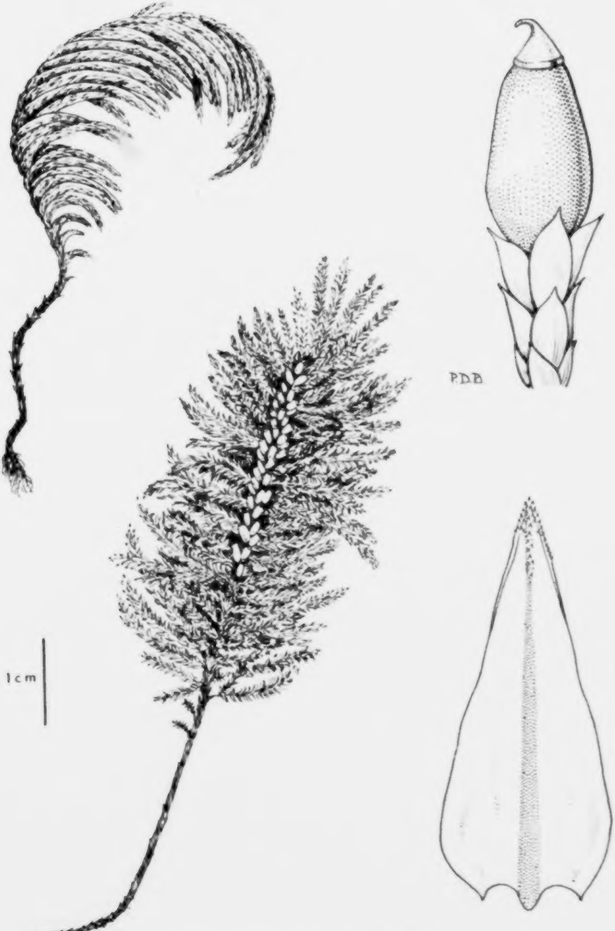
Sporophytes numerous on crowded short perichætial branches on the underside of the main stem. Seta obscured by clasping perichætial leaves. Capsule erect, ovate, 1.5 mm. long, 1 mm. wide, red-brown, not glossy, somewhat wrinkled when dry. Operculum conic, 0.5 mm. long, yellowish to brown. Peristome colourless. Sporophytes maturing in spring.

Habitat.—Epiphytic and pendent on trunks of deciduous trees, particularly broad-leaved maples and oaks, sometimes on dry cliffs, where it often forms extensive colonies.

Similar Species.—Might be confused with *Antitrichia californica,* but this species has capsules exserted on a long seta, the branches are generally widely placed so that the plant is pinnate and not dendroid pinnate.

Distribution in B.C.—Mainly coastal in the south-western portion of the Province.

Range.—Endemic to Western North America: B.C. to California, east to Idaho.



Dendroalsia abietina

Dichodontium flavescens **(Turn.) Dixon**

Gametophytes light green to dark green, sometimes brownish, forming loose turfs of erect, little-branched plants 1–5 cm. deep, somewhat glossy, leaves much crisped when dry. Stem light brown. Leaves ovate to ovate-lanceolate, 2–3 mm. long, 1–1.5 mm. wide, margins appearing entire at 12×, but with small teeth near bluntish apex, costa forming a ridge on the back of the leaf. Perichætial leaves like other leaves. Calyptra cucullate, smooth, early deciduous.

Sporophytes at apex of main shoots. Seta 0.7–2 cm. long, yellow to red-brown to dark brown, smooth, not twisted when dry. Capsule erect to suberect, ovate to oblong, apophysis apparent, not glossy, 2–4 mm. long, including operculum, 0.2–0.5 mm. wide, dark brown when mature. Operculum conic to rostrate, 1–2 mm. long. Capsule contracted below mouth when dry. Peristome dark red, flaring when dry. Sporophytes maturing in winter.

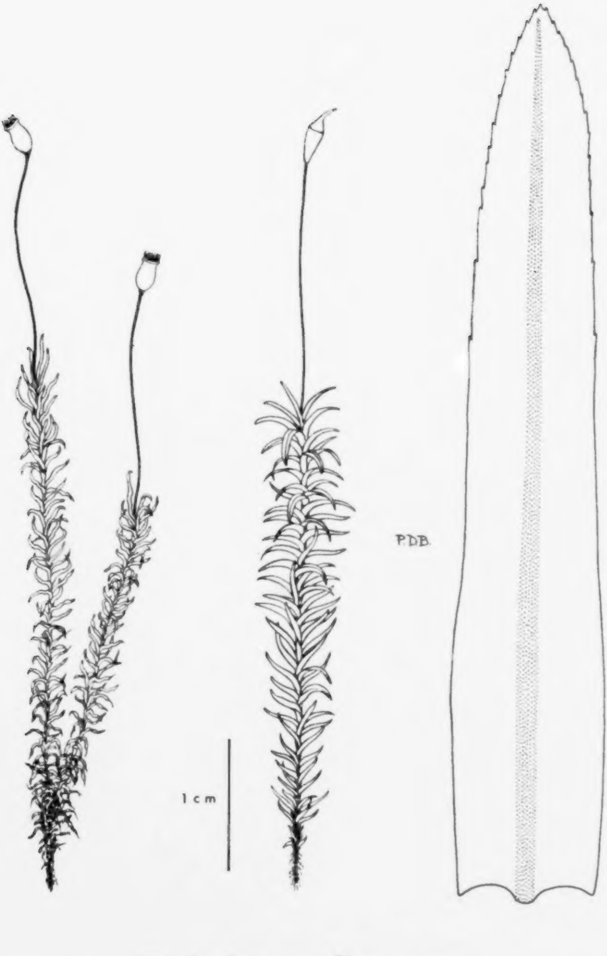
Habitat.—Wet sites, cliff crevices, stream and river margins, springs.

Similar Species.—May be confused with *Dicranella squarrosa*, but the *Dicranella* possesses glossy, squarrose leaves, and is not strongly crisped when dry. *Barbula cylindrica* differs in the cylindric capsule, and the twisted peristome teeth. *Oncophorus virens* is similar, but in this species the peristome teeth are incurved rather than flared outward when dry, the capsule is not contracted below the mouth when dry, and is curved and strumose.

Distribution in B.C.—Mainly on the humid coast, but also present in the humid Interior on the western flanks of the Rocky Mountains.

Range.—Circumboreal in the Northern Hemisphere.

Notes.—This is often treated as *Dichodontium pellucidum* and may be indistinguishable from that species.



Dichodotium flavescens

***Dicranella heteromalla* (Hedw.) Schimp.**

Gametophyte dark green to light green, glossy, forming dense short turfs of erect plants 0.5–2 cm. deep. Stem red-brown. Leaves subulate from ovate base, 3–5 mm. long, the costa making up the bulk of the leaf except the ovate base, which is 0.2 mm. wide. Leaves falcate secund, slightly crisped when dry. Perichætial leaves like others. Calyptra smooth, cucullate, early deciduous.

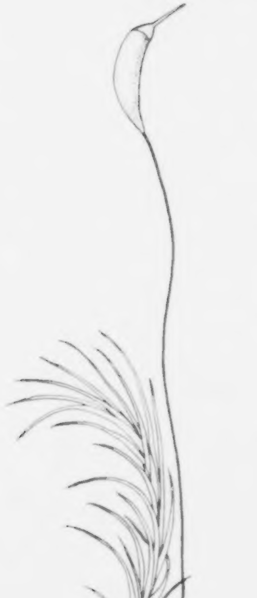
Sporophytes at apex of main shoot, but appearing lateral as a lateral branch grows beyond the perichætium. Seta 1–2 cm. long, smooth, yellow, twisted when dry. Capsule golden brown, inclined, ovate, curved, grooved, and contracted below mouth when dry, 1–2.5 mm. long, including operculum, 0.5 mm. wide; operculum rostrate, 1 mm. long. Peristome teeth red, incurved when dry. Sporophytes maturing in spring.

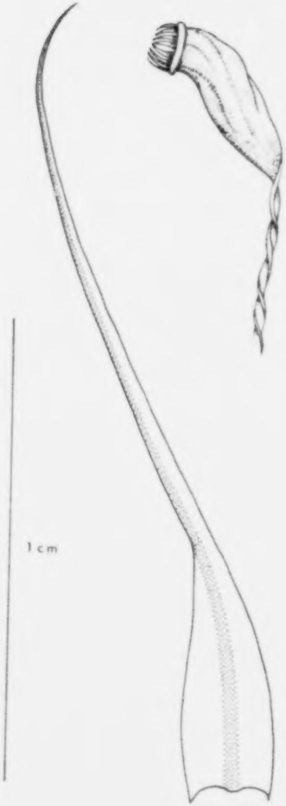
Habitat.—Bare inorganic soil of disturbed banks, overturned roots, stream and road margins.

Similar Species.—May be confused with other species of *Dicranella,* but the distinctively grooved capsule serves to separate it on hand-lens features. When sterile it is often difficult to distinguish from some species of *Ditrichum.*

Distribution in B.C.—Probably throughout the Province except in the arid Interior.

Range.—Circumboreal in the Northern Hemisphere, scattered in the Southern Hemisphere.





Dicranella heteromalla

Dicranella rufescens (With.) Schimp.

Gametophytes rusty red-brown to sometimes green, forming fine thin turfs of erect plants 1–6 mm. tall. Stem red-brown. Lower leaves ovate, 1 mm. long, 0.2 mm. wide at base, apical leaves lanceolate to subulate, 2 mm. long, 0.2 mm. wide at base, slightly curled when dry, barely glossy; costa forming an obscure ridge on the back of the leaf. Perichætial leaves forming the divergent mass of longer leaves at the shoot apex. Male plants similar, but tipped with the bulb-like perigonium. Calyptra smooth, cucullate, early deciduous.

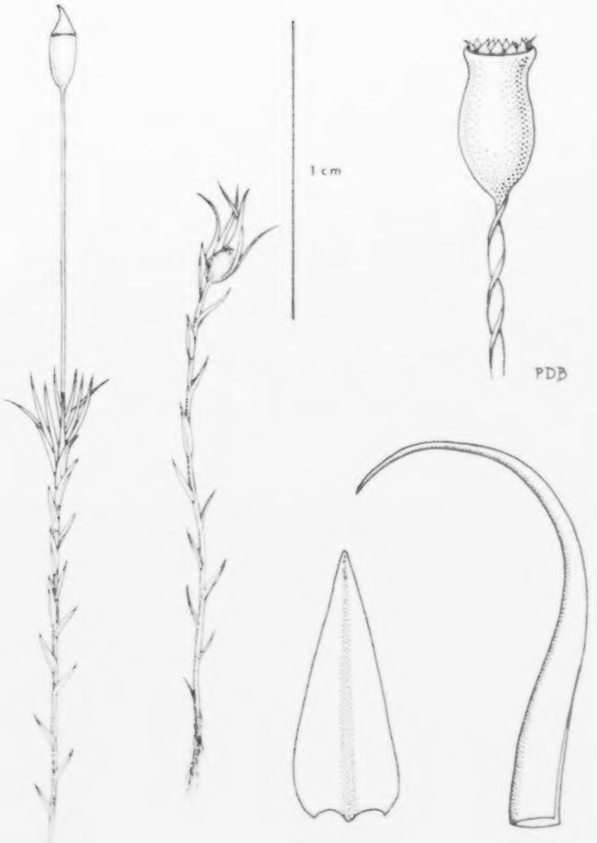
Sporophytes at apex of main shoot. Seta dark red, smooth, twisted when dry, 1 cm. long. Capsule dark brown, ovate, erect, 1 mm. long, 0.2–0.3 mm. wide, not glossy, contracted below mouth when dry. Operculum conic to rostrate 0.5–0.7 mm. long. Peristome red, flaring when dry. Sporophytes maturing autumn and winter.

Habitat.—Exposed damp silty and sandy banks.

Similar Species.—May possibly be confused with *Ditrichum pusillum,* but in this species the capsule is cylindric and pale brown, the leaves never divergent, and the peristome teeth are small and erect rather than broad and flaring.

Distribution in B.C.—The humid Coast and humid Interior to the western flanks of the Rocky Mountains.

Range.—Circumboreal in the Northern Hemisphere, also in South America.



Dicranella rufescens

Dicranoweisia cirrhata (Hedw.) Lindb.

Gametophytes dark green to light green, forming dense tufts of erect plants 3–6 mm. deep. Stem green to pale brown. Leaves lanceolate, 2–3 mm. long, 0.5 mm. wide at base, entire, crisped when dry, not glossy; costa obscure, even under transmitted light. Perichætial leaves like others. Calyptra cucullate, smooth, early deciduous.

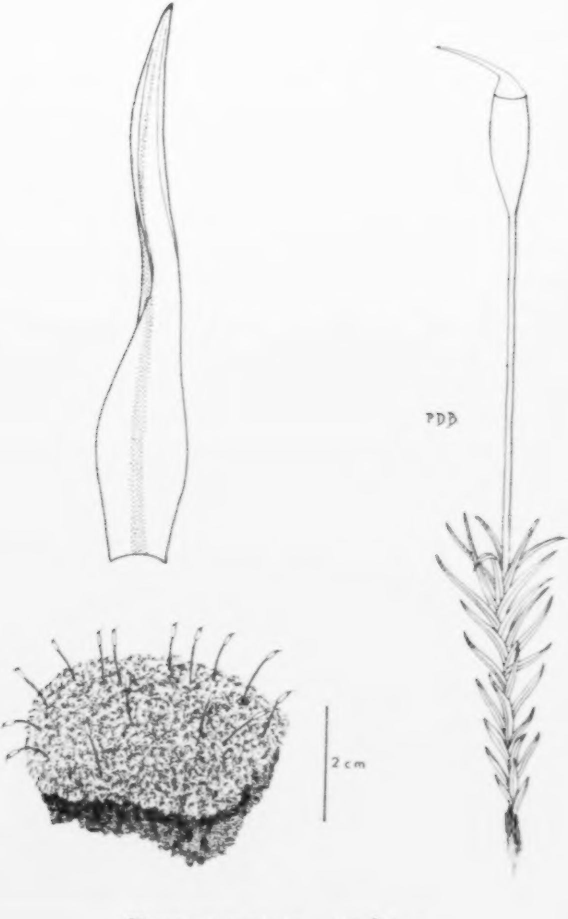
Sporophytes at apex of main shoot. Seta yellow, smooth, twisted when dry, 0.7–1.5 cm. tall. Capsule cylindric, erect, 3 mm. long, including operculum, 0.5 mm. wide, not glossy, brown; operculum rostrate, peristome of short obscure red teeth. Sporopyhtes maturing in winter.

Habitat.—Epiphytic on tree trunks and branches, on logs generally in sunny areas, occasionally on rock and even on roofs of houses, where it may become abundant.

Similar Species.—A very distinctive species in both ecology and appearance, not likely to be confused with any other in the Province except *Dicranoweisia crispula*, from which it is not readily separated on hand-lens features; this latter species is largely in subalpine to alpine areas.

Distribution in B.C.—Principally a coastal species, but has been reported from the humid Interior.

Range.—Circumboreal in the Northern Hemisphere, also in Australia.



Dicranoweisia cirrhata

Dicranum fuscescens Turn.

Gametophytes dark green to light green, slightly glossy, forming loose turfs or tufts of erect unbranched plants 1–5 cm. deep. Stem red-brown. Leaves lanceolate, falcate-secund, 10 mm. long, 1 mm. wide at base, crisped when dry, margins entire, small teeth apparent at apex (at 12×); costa forming a keel on the back of the leaf; alar regions of larger colourless or sometimes rust-coloured cells. Perichætial leaves lanceolate, clasping base of seta. Calyptra cucullate, smooth, early deciduous.

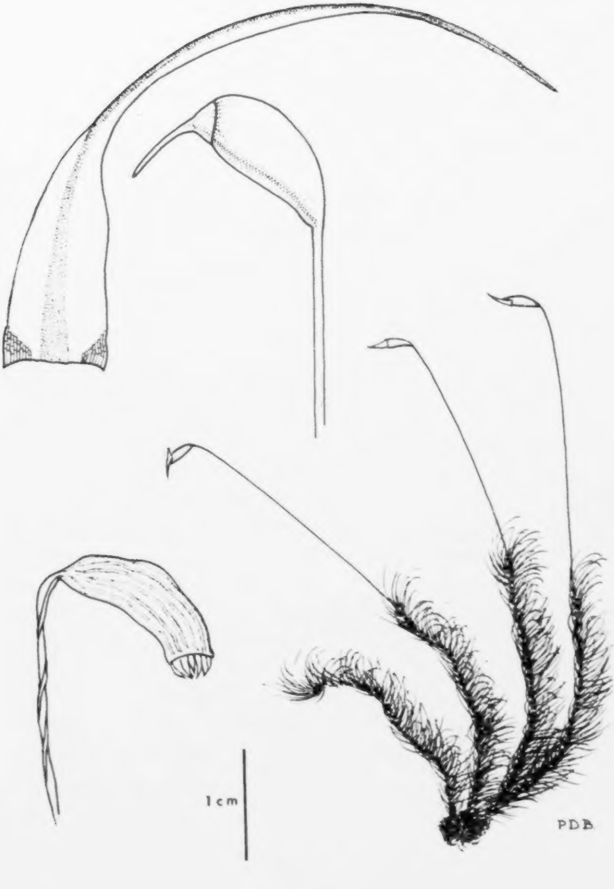
Sporophytes at apex of main shoot. Seta 1.5–2 cm. long, yellow to brown, smooth, twisted when dry. Capsule inclined, cylindric 4 mm. long, including operculum, 1 mm. wide, curved, strumose, brown, with parallel grooves and contracted below the mouth when dry and mature. Operculum rostrate, 2 mm. long. Peristome teeth red, incurved when dry. Sporophytes maturing in summer.

Habitat.—Usually on wood, on logs, or as an epiphyte, sometimes on forest floor or humus of cliff ledges.

Similar Species.—Might be confused with *Dicranum scoparium,* but in this species the leaves are strongly glossy, are usually not crisped when dry, the capsule is never strumose, and is only rarely grooved when dry, and then the grooves are few and obscure. *Dicranum pallidisetum* is not readily separable on hand-lens characters; it is a species of subalpine areas. From *Dicranum muhlenbeckii*, generally a species of bogs, it differs in hand-lens characters, in the erect cylindric, uncurved capsule. From *Dicranella heteromalla* it differs in numerous features, including the larger size of *Dicranum,* the alar cells, the parallel grooves of the capsule rather than twisted grooves as in *Dicranella.*

Distribution in B.C.—Probably throughout, except in the arid regions.

Range.—Circumboreal in the Northern Hemisphere, also in South America.



Dicranum fuscescens

Dicranum scoparium Hedw.

Gametophytes light green to golden green, strongly glossy, forming loose turfs of erect unbranched plants 2–9 cm. deep, or sometimes deeper. Stem red-brown. Leaves lanceolate, usually secund and often falcate, 10–15 cm. long, 1 mm. wide, not crisped when dry, margins entire, teeth apparent near apex (at 12×); costa forming a ridge on the back of the leaf; alar regions of larger red-brown cells. Perichætial leaves lanceolate, clasping base of seta. Calyptra cucullate, smooth, early deciduous.

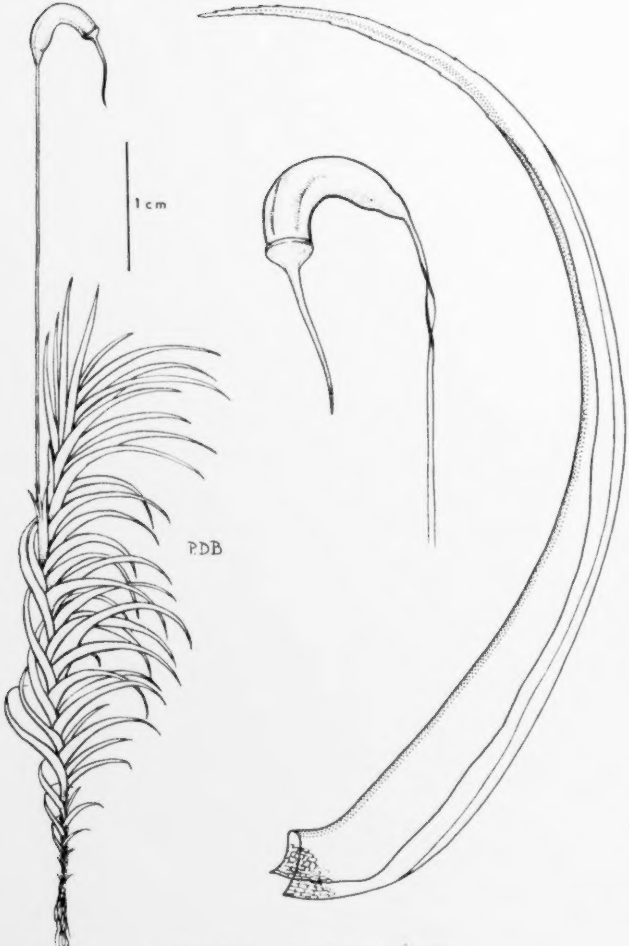
Sporophytes at apex of main shoot, one per perichætium. Seta yellow to brownish, smooth, 2–3 cm. long, twisted when dry. Capsule inclined, cylindric, curved, 6 mm. long, including operculum, 1 mm. wide, brown, never strumose or with conspicuous regular parallel grooves when dry. Operculum rostrate, 3 mm. long, often red. Peristome teeth red-brown, incurved when dry. Sporophytes maturing in summer and autumn.

Habitat.—On rotten logs, exposed cliff ledges, sometimes on forest floor.

Similar Species.—Might be confused with *Dicranum fuscescens* (*see* note under that species). *Dicranum majus* is similar, but the multiple setæ from a single perichætium separate it immediately. *Dicranum polysetum* has undulate leaves, matted rhizoids on the stem, and multiple setæ that separate it. *Dicranum howellii* cannot be distinguished on hand-lens features.

Distribution in B.C.—Probably throughout, except in arid regions.

Range.—Circumboreal in the Northern Hemisphere, also in New Zealand and South America.



Dicranum scoparium

Dicranum strictum Mohr.

Gametophytes dark green, glossy, forming dense brittle turfs and cushions of erect unbranched plants 1–2.5 cm. deep. Stems red-brown, often with whitish masses of rhizoids in older portions. Leaves lanceolate, 7–10 mm. long, usually shorter, the upper 0.3 mm. long, often broken off, 0.5 mm. wide at base, margins entire; costa forming a keel on the back of the leaf; alar cells red-brown. Perichætial leaves lanceolate, slightly clasping base of seta. Calyptra cucullate, smooth, early deciduous.

Sporophytes at apex of main shoot, seta yellow to brown, smooth, 1.5–2 cm. long, twisted when dry. Capsule brown, erect, cylindric, somewhat glossy, 4.5 mm. long, including operculum; 1 mm. wide. Operculum rostrate, 2 mm. long. Peristome teeth red to brown, incurved when dry. Sporophytes maturing in summer, not commonly produced.

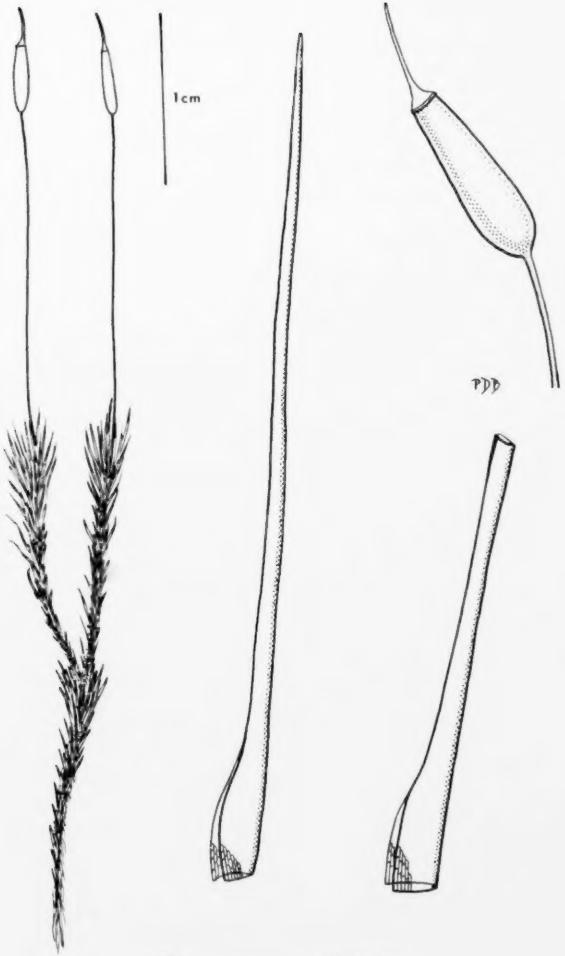
Habitat.—Rotten logs, usually of coniferous wood, in coniferous forests, rarely on humus, sometimes on reclining alder trunks, particularly in subalpine areas.

Similar Species.—Not likely to be confused with any other moss in B.C.; the brittle leaf apices and the rotten log habitat, as well as the erect cylindric capsule, are all distinctive features.

Distribution in B.C.—Probably throughout in humid coniferous forest, most abundant in the areas where Douglas fir (*Pseudotsuga menziesii*) is an important tree.

Range.—Europe and Western North America: Alaska southward to California and eastward to western Montana, also in Kerguelen Island in the Southern Hemisphere.

Notes.—This species is now generally treated as *Dicranum tauricum* Sapehin.



Dicranum strictum

Distichium capillaceum **(Hedw.) B.S.G.**

Gametophytes dark green to light green, sometimes brownish-green, glossy, particularly at leaf bases, forming dense turf of erect little-branched plants 0.7–4 cm. deep. Stems red-brown to yellowish. Leaves subulate from a lanceolate sheathing base, 0.3–0.8 mm. long, 0.5 mm. wide at base, distinctly two-ranked with the sheathing leaf bases overlapping and giving the plant the rough appearance of a head of wheat; leaf margins entire; costa forming the keel of the sheathing leaf. Perichætial leaves like the others, not markedly sheathing the base of the seta. Calyptra cucullate, smooth, early deciduous.

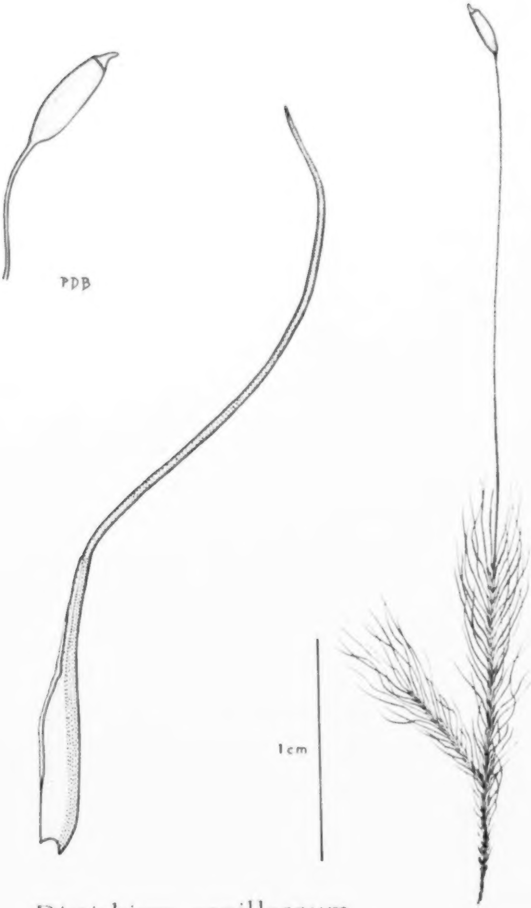
Sporophytes at apex of main shoot. Seta red-brown, smooth, 1–1.5 cm. long, somewhat twisted when dry. Capsule light to dark brown, cylindric, 1.5–2 mm. long, including operculum, 0.5 mm. wide, erect, glossy. Operculum conic, 0.5 mm. long. Peristome teeth red-brown, erect and inconspicuous when dry. Sporophytes maturing in summer.

Habitat.—Cliff crevices, usually calcareous, sometimes in tundra, where it is often abundant.

Similar Species.—Distichium inclinatum is similar, but the capsule is inclined, otherwise the two species are indistinguishable on hand-lens characters. The two-ranked subulate leaves with the glossy leaf bases separate this genus from any other moss in the Province.

Distribution in B.C.—Probably throughout, but possibly absent in much of the arid Interior.

Range.—Cosmopolitan in both the Northern and Southern Hemispheres.



Distichium capillaceum

Ditrichum heteromallum **(Hedw.) E. G. Britt.**

Gametophytes dark green, glossy, forming short turfs of erect unbranched plants 0.3–1.2 cm. deep Stems red-brown. Leaves lanceolate to subulate, 2–4 mm. long, the lowest leaves the smallest, 0.7 mm. wide at base, often slightly secund; margins entire; costa forming an obscure keel on the back of the leaf. Perichætial leaves like others, sheathing base of seta. Calyptra cucullate, smooth, early deciduous.

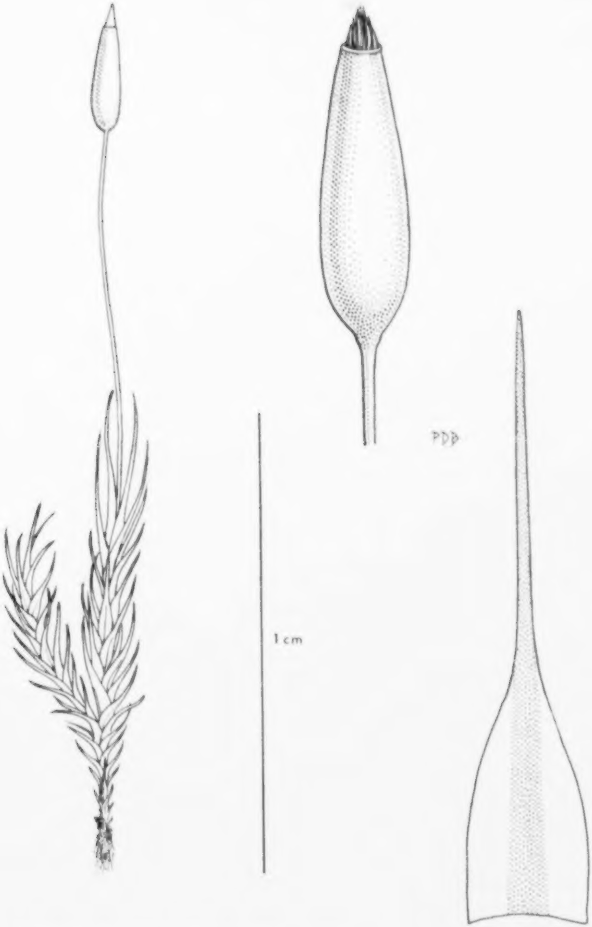
Sporophytes at apex of main shoot. Seta red, smooth, 1.5–2.5 cm. long, twisted when dry. Capsule dark brown to red-brown, erect, cylindric, 2–3.5 mm. long, including operculum, 0.3 mm. wide, narrowing toward mouth, not glossy. Operculum conic, 0.5 mm. long. Peristome teeth red-brown, erect or slightly incurved when dry, hair-like. Sporophytes maturing in autumn.

Habitat.—Sandy, silty, or muddy open banks, sometimes on overturned tree roots.

Similar Species. — Can be confused with other species of *Ditrichum*. *D. ambiguum* has capsules generally longer (3 mm.), operculum longer (0.8 mm.), and the leaves markedly crisped when dry. *D. cylindricum* has a yellow seta, the leaves crisped when dry. *D. montanum* has a yellow seta, leaves are somewhat crisped when dry, and the peristome teeth are long and conspicuous. From *D. pusillum* it is difficult to separate small specimens of *D. heteromallum* on hand-lens features.

Distribution in B.C.—Probably mainly coastal, but possibly in the humid Interior.

Range.—Eurasia and North Africa, Western North America from Alaska to California and east to western Montana, also South-western South America.



Ditrichum heteromallum

Drepanocladus uncinatus (Hedw.) Warnst.

Gametophytes pale green to golden green, glossy, loosely pinnate-branched, the plants 2–5 cm. long with branches 0.5–1 cm. long, forming loose mats of creeping plants. Stem green to yellowish. Leaves strongly falcate-secund, lanceolate from an ovate base, 3–4 mm. long, 1 mm. wide, the upper half of the leaf curving over. Leaves entire, strongly pleated; costa forming an obscure ridge on the back of the leaf, not crisped when dry. Perichætial leaves lanceolate, clasping base of seta. Calyptra smooth, cucullate, early deciduous.

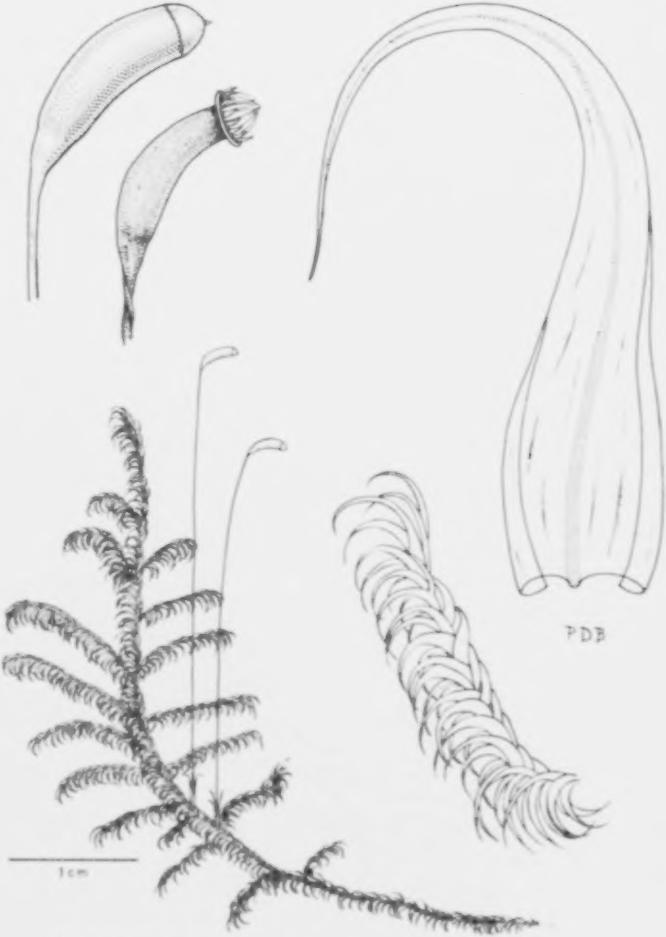
Sporophytes on short lateral perichætial branches arising well behind the apex of the main shoot. Seta 2 cm. long, red, smooth, twisted when dry. Capsule brown, curved and inclined or cylindric and erect, 3–4 mm. long, 0.5 mm. wide, not glossy, contracted below mouth when dry. Operculum conic, 0.5 mm. long. Sporophytes maturing in summer.

Habitat.—Various—on forest floors, on rotten logs, up bases of living trees, in bogs, tundra, on cliffs, and on boulders.

Similar Species.—Species of *Hypnum* are superficially similar, but none have costate or regularly pleated leaves. *Ptilium crista-castrensis* might be confused with it, but the gametophytes of this species are more densely pinnate, making them plumose, the leaves also possess a double rather than a single costa. It is difficult to distinguish other species of *Drepanocladus* from this species, but *D. uncinatus* is the only species of drier habitats and with leaves strongly pleated. Some species of *Hygrohypnum* might be confused with *Drepanocladus*, but the leaves are not pleated and the costa is generally shorter or double.

Distribution in B.C.—Commonest in the northern and eastern montane portion of the Province, but also in montane areas of the Coast.

Range.—In temperate and arctic climates in both the Northern and Southern Hemispheres.



Drepanocladus uncinatus

Encalypta ciliata Hedw.

Gametophytes dark green to pale green, not glossy, of little-branched erect plants forming loose tufts or turfs with the upper leaves forming an apical rosette; plants 0.5–2 cm. high. Stems red-brown, usually with numerous red rhizoids. Leaves oblong-ovate, 4–5 mm. long, 1–1.5 mm. wide, usually rounded toward the small point at the apex, crisped when dry, lowermost cells colourless, visibly elongate at 12×; costa forming a conspicuous, often brownish, ridge on the back of the leaf. Perichætial leaves like others. Calyptra conic, covering most of the capsule until mature, with a distinct and regular fringe on the lower margin.

Sporophytes at apex of main shoot, but appearing lateral when mature due to the growth of a lateral branch beneath the perichætial apex. Seta yellow to pale brown, smooth, 0.7–1.5 mm. long, twisted when dry. Capsule pale brown, erect, cylindric, 4.5 mm. long, including operculum, 0.5 mm. wide, not glossy, not grooved when dry, sometimes contracted below mouth when dry. Operculum rostrate, 1.5 mm. long. Peristome teeth red, erect when dry, early deciduous. Sporophytes maturing in summer.

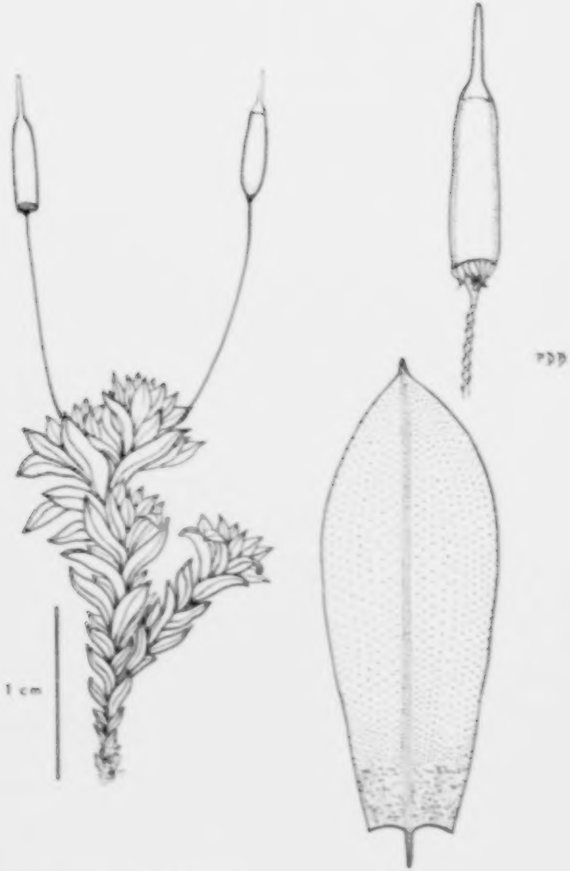
Habitat.—Generally calcareous substrates—cliff crevices and shelves, and banks.

Similar Species.—Can be confused with other species of *Encalypta*, but not likely to be taken for anything else if the calyptra is present. The smooth capsule, the conspicuous peristome, and the fringed calyptra generally will separate it from *E. vulgaris*, *E. rhabdocarpa*, and *E. procera*. Unfortunately some specimens of *E. vulgaris* and *E. rhabdocarpa* have ungrooved capsules, but the calyptra is never fringed. Most other species of *Encalypta* are not readily separated on hand-lens characters.

Distribution in B.C.—Probably throughout wherever the habitat is available.

Range.—Mountains of Europe, circumboreal in Asia and North America and in mountains southward to South America and India, also in Australia and New Zealand.

Notes.—Sometimes called " extinguisher moss " because of the fancied resemblance of the calyptra to a candle snuffer.



Encalypta ciliata

Eurhynchium oreganum **(Sull.) Jaeg. & Sauerb.**

Gametophytes glossy, creeping, forming interwoven mats with youngest shoots slightly arching upward from the older reclining shoots, varying from yellowish-green to dark green, the younger shoots often pale green; stems varying from 5–30 cm. long, often longer when climbing up the bark of smooth trees; when mat forming, the mats usually no more than 2–3 cm. deep, the older parts of the mat brown and regularly pinnate-branched, the longest branches rarely more than 5–6 mm. long, shorter near apex of shoot; the leaves on stem with slightly clasping base, the broad portion standing perpendicular to the stem and the acute apex pointing upward; leaves cordate, tapering to a narrow acute point, 1–1.5 mm. long and to 1 mm. broad at base; costa single, ending about two-thirds length of leaf, hardly entering the tapered point; leaf margins with numerous small teeth; rhizoids few, generally confined to the base of the current year's growth, dark red-brown on underside of stem. Perichætial branches 2–4 mm. long, pale brownish-yellow, the upper perichætial leaves with long tapering hair points, 1–2 mm. long. Calyptra yellowish, smooth, covering upper one-third of capsule and operculum.

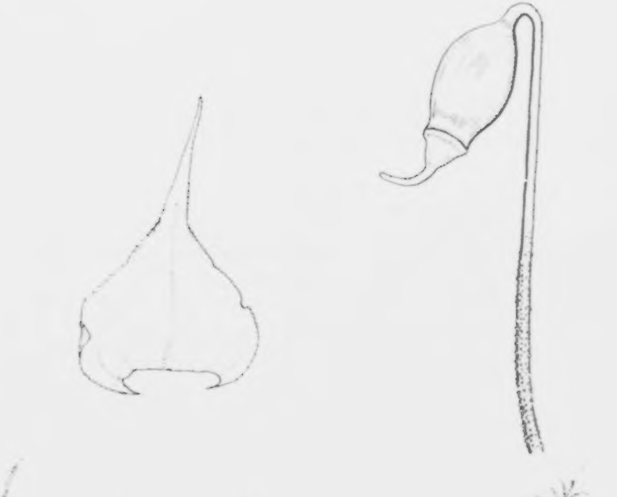
Sporophytes 1.5–3 cm. tall, the rough seta dark red-brown; capsule ovate, nodding to inclined, 2 mm. long (excluding operculum), the neck red-brown but the body generally dull yellow-brown when mature, 1 mm. in diameter at broadest point, often somewhat constricted below the mouth when dry; operculum rostrate, 1–2 mm. long; outer peristome teeth red-brown with yellowish tips, the inner whitish. Sporophytes appearing in late autumn, maturing in spring.

Habitat.—Coniferous forests, on logs, trees, even forest floor, sea-level to subalpine elevations.

Similar Species.—Can be confused with *Eurhynchium stokesii* —note discussion under that species.

Distribution in B.C.—Most abundant in the humid Coast forests, also in humid Interior forests.

Range.—A Western American endemic: Alaska southward to California, eastward to Idaho.



Eurhynchium oreganum

Eurhynchium stokesii (Turn.) B.S.G.

Gametophytes glossy, creeping, forming shallow interwoven mats with youngest shoots slightly arching upward from older reclining shoots, dark green to pale green; stems 3–5 cm. long, sometimes longer in humid sites, the mats rarely more than 2 cm. deep, older parts brown; branching with slender pinnate tapering branches, these also frequently bearing short branches; longest branches 5–6 mm. long, becoming abruptly shorter near the tapered shoot apex. Leaves arranged on stem with slightly clasping base, curving upward from base; leaves cordate to ovate, tapering to an acute or bluntish apex, 0.7–1 mm. long and to 0.7 mm. broad at base; costa single, extending into tapered point, but not reaching apex; leaf margins with many small teeth; rhizoids generally confined to reclining portion of plant, dark red-brown, smooth. Perichætial branches 2–3 mm. long, pale brownish-yellow, upper leaves with tapering hair points to 1 mm. long. Calyptra yellowish, smooth, covering upper one-third of capsule and operculum.

Sporophytes 2–3 cm. tall, rough seta dark red-brown; capsule elliptic to ovate, inclined, 1–1.5 mm. long (excluding operculum), neck red-brown but body generally dull yellow to dark brown when mature, 0.7–1 mm. in diameter at broadest point, often constricted below the mouth when dry; operculum rostrate 1–1.5 mm. long; outer peristome teeth red-brown with yellowish tips, the inner whitish. Sporophytes appearing in winter, maturing in early spring.

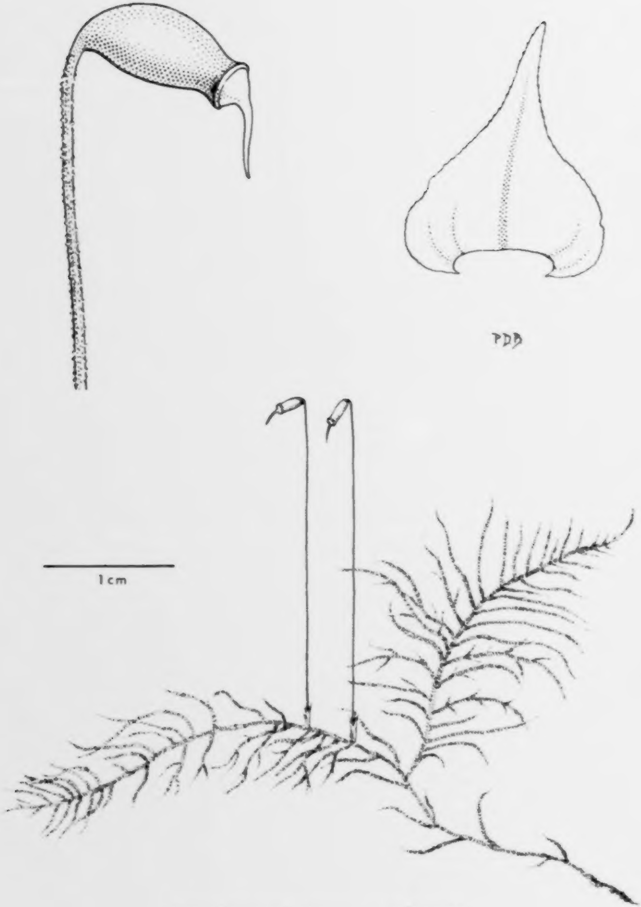
Habitat.—Coniferous forests, on logs, trees, boulders, cliffs, and in swampy areas where it reaches its richest development; can tolerate extreme environments just above high-tide level on the seashore; predominantly of low elevations but also in alpine areas.

Similar Species.—Some forms might be confused with *Hylocomium splendens*, but the stem leaf shape and nature of costa readily distinguish them. Some forms of *Eurhynchium oreganum* are nearly indistinguishable, even with a compound microscope. *Brachythecium* rarely has a rostrate operculum and is thus distinguished.

Distribution in B.C.—Primarily a species of the coastal coniferous forests, but present also in the moister coniferous forests of the Columbia Mountains.

Range.—Circumboreal in Europe and Asia, also in North Africa; in North America confined to west of the Rocky Mountains, Alaska southward to California.

Notes.—This species is now generally treated as *Eurhynchium prælongum* (Hedw.) B.S.G.



Eurhynchium stokesii

Fissidens adianthoides Hedw.

Gametophytes dark green, not glossy, forming turfs of suberect to erect little-branched plants 0.5–4 (occasionally to 8) cm. deep, sometimes creeping or festooning cliffs. Stems green. Leaves arranged in two ranks, the whole plant complanate (flattened), the leaves overlapping by a sheathing flap fused to the costa. Leaves with numerous fine teeth on the margins, oblong to strap-like, 3–3.5 mm. long, 1.5 mm. wide, apex acute, the sheathing portion making up more than half of the leaf, the lower leaves smaller than those of the remainder of the plant, crisped and usually curled under when dry; costa distinct. Perichætial leaves small, sheathing base of seta, lacking special sheathing flap. Calyptra smooth, cucullate, early deciduous.

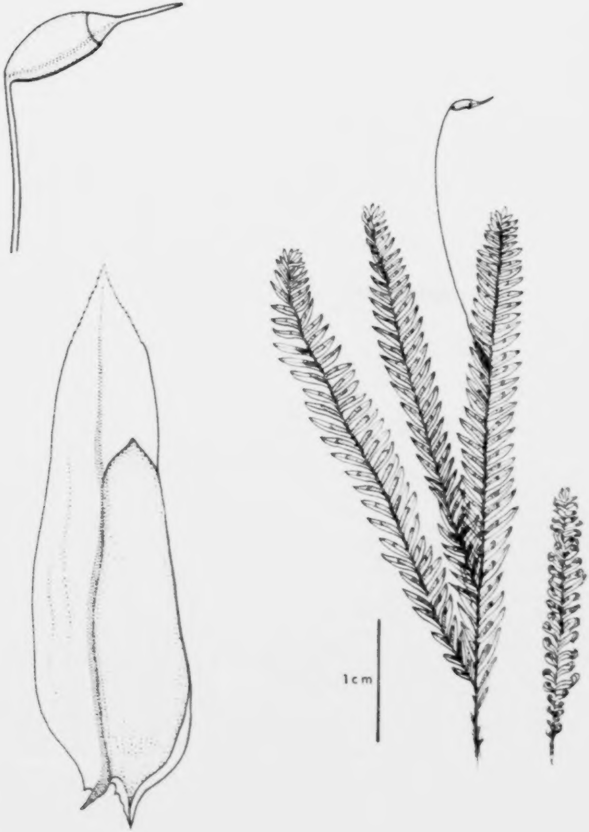
Sporophytes lateral from short perichætial branches arising on the main shoot well behind the shoot apex. Seta 0.4–1.5 cm. long, red, smooth, twisted when dry. Capsule a dark red-brown, inclined, oblong to ovoid, 2–2.5 mm. long, including operculum, 0.7 mm. wide, not glossy, contracted below mouth when dry. Operculum rostrate 1–1.5 mm. long. Peristome teeth red, flaring outward when dry. Sporophytes maturing in autumn.

Habitat.—Damp cliffs in canyons, occasionally on earth of lakeshores, river margins and in swamps.

Similar Species.—Might be confused with *Fissidens grandifrons,* but this species is generally submerged on rocks in rapid streams, the leaves are narrower, the costa is barely visible due to the thickness of the leaf (in *F. adianthoides* the leaf is translucent, in *F. grandifrons* the leaf is opaque). *Fissidens ventricosus* is another species of wet rocks that might be confused with *F. adianthoides,* but the leaf has a distinct clear margin of colourless elongate cells and the sporophyte is erect rather than inclined and is at the apex of the main shoot. *F. osmundioides* and *F. taxifolius* are also similar, but both are much smaller with the leaves usually less than 1 mm. long.

Distribution in B.C.—Probably scattered throughout wherever cool humid habitats are available.

Range. — Circumboreal, largely temperate in the Northern Hemisphere, also in Southern South America, Australia, and New Zealand.



Fissidens adianthoides

Fissidens limbatus Sull.

Gametophytes light green to dark green, not glossy, forming scattered suberect little-branched plants 1–5 mm. high. Stems green. Leaves arranged in two ranks, the whole plant complanate (flattened), the leaves overlapping by sheathing flap fused to the costa. Leaves entire, margin white from colourless elongate cells, oblong, 1–1.2 mm. long, 0.3–0.4 mm. wide, crisped when dry; costa distinct, usually colourless. Perichætial leaves similar to others, not clasping base of seta. Calyptra smooth, cucullate, early deciduous.

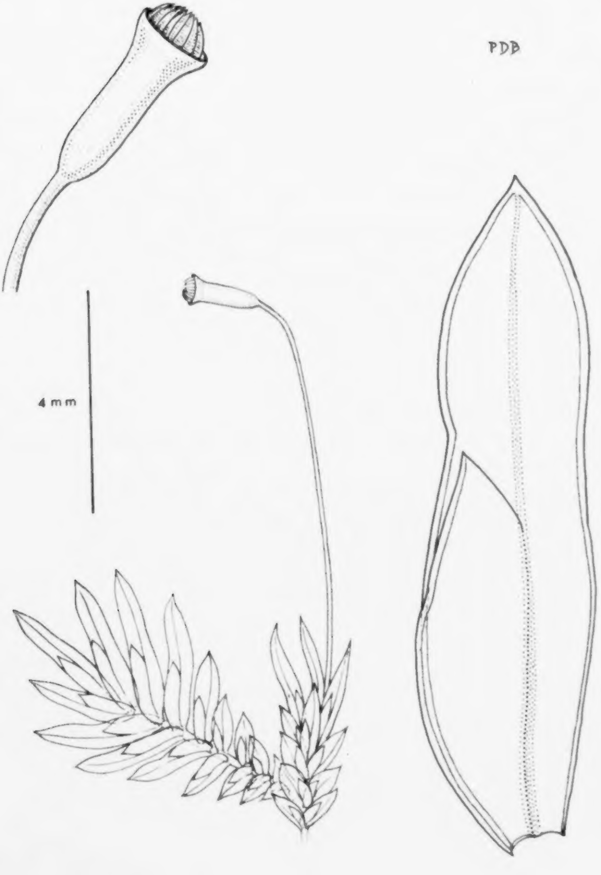
Sporophytes at apex of main shoot. Seta 0.5–1 cm. long, red, smooth, twisted when dry. Capsule green to brown, inclined to suberect, oblong to ovoid, 1 mm. long, 0.2 mm. wide, often contracted below mouth when dry. Operculum conic, 0.1–0.2 mm. long. Peristome teeth red, incurved when dry. Sporophytes maturing in early spring.

Habitat.—On raw earth of open or shaded banks, sometimes in cliff crevices and bases of boulders in forest.

Similar Species.—Difficult to distinguish from *F. minutulus,* but this is usually smaller, the capsule is normally erect and matures in late autumn. *F. bryoides* is nearly impossible to distinguish even on a microscopic basis. *F. taxifolius* does not possess the white margin of colourless cells on the leaf.

Distribution in B.C.—Largely Coastal, but found also in the Interior, even in moister sites in the arid region.

Range.—Endemic to Western North America, from northern B.C. southward to California, eastward to western Montana.



Fissidens limbatus

Fontinalis antipyretica **Hedw.**

Gametophytes extremely variable, dark green to light green, sometimes golden brown to reddish-brown, 10–80 cm. long, glossy, with regular but not pinnate branches arising in (generally) three ranks, the branches 0.5–6 cm. long; stems attached at base or free floating in water so that the plant is essentially suberect or reclining, dependent on the water depth. Leaves conspicuously in three ranks, divergent, keeled, often distant, ovate-lanceolate, 3–7 mm. long, 2–3 mm. wide, with no costa, apex varying from bluntish to sharply acute, margin entire; not crisped when dry. Perichætial leaves ovate, with blunt broad apex, sheathing the entire capsule. Calyptra smooth, cucullate, shed just before dehiscence of the capsule.

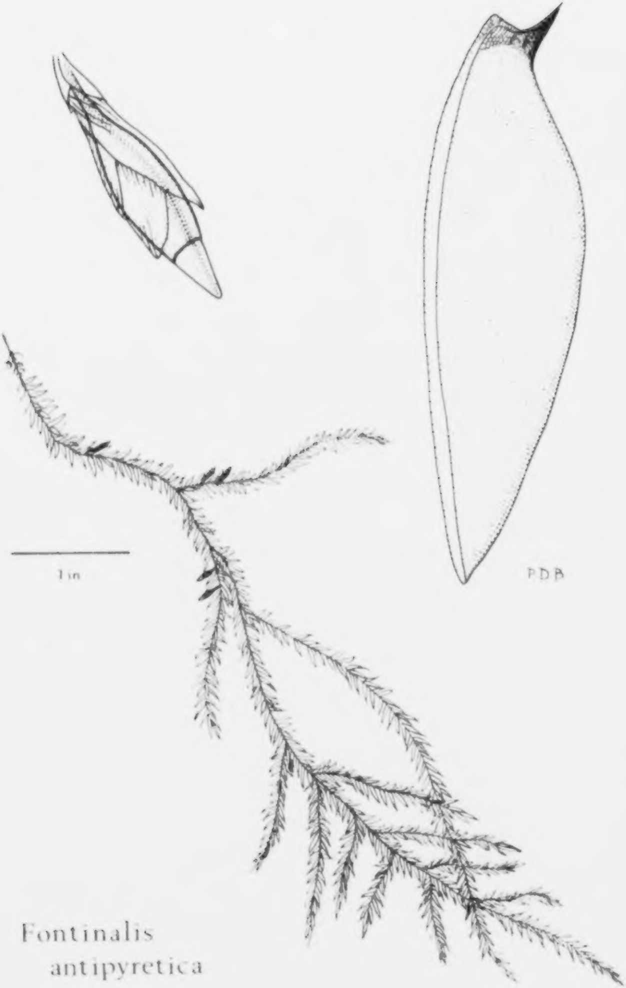
Sporophytes immersed in short lateral perichætial branches on the main shoot or sometimes on lateral shoots. Seta essentially none. Capsule erect to suberect from the main shoot, light brown, cylindric, 4 mm. long, including operculum, 1 mm. wide, not glossy. Operculum conic, 1 mm. long. Peristome double, red, the outer teeth curved inward and the inner teeth forming a lattice-like open-ended cone. Sporophytes maturing in summer.

Habitat.—Aquatic, attached to rocks in streams or rivers, sometimes lake margins, often on submerged logs and branches, sometimes floating in quiet margins of lakes and pools in forests.

Similar Species.—Cannot be readily distinguished from *F. howellii* or *F. patula,* with which some of the many variations of *F. antipyretica* appear to be identical. Might be confused with *Calliergon giganteum,* but the leaves of this species are costate and the alar regions distinct; of course, the sporophytes would separate it immediately. From *Calliergonella cuspidata,* a species of similar habitat, it can be distinguished readily since the *Calliergonella* has a double costa, well-defined alar regions, the leaves are not keeled, and if sporophytes are present they possess a long seta and the capsule is inclined and contracted below the mouth when dry.

Distribution in B.C.—Probably throughout wherever the habitat is available. Not likely even in ponds of the arid regions.

Range.—Circumboreal in the Northern Hemisphere, also in both North and South Africa.



Fontinalis
antipyretica

Funaria hygrometrica Hedw.

Gametophytes light green, glossy, forming scattered erect unbranched plants on earth, 0.3–0.5 cm. tall, the upper leaves forming either a rosette or a bulb-like perichætium. Stems red-brown. Leaves ovate, 2–4 mm. long, 1–2 mm. wide, entire, the cells large enough to be apparent at 12×, not crisped when dry; costa distinct, not forming a ridge or keel. Perichætial leaves like others but forming a bulb-like sheath at the base of the seta. Calyptra cucullate, smooth, the lower portion expanded to enclose the swollen apex of the capsule, deciduous just before the capsule matures.

Sporophytes at apex of shoot. Seta 1.5–4 cm. long, yellow, smooth, glossy, markedly hygroscopic (coiling and uncoiling with changes in humidity), twisted when dry. Capsule inclined to nearly nodding, yellow to golden brown, ovate, 2–3 mm. long, 1–1.2 mm. wide, strongly grooved when dry, the operculum usually oriented obliquely to the length of the capsule so that the mouth points downward when the capsule is mature, although the capsule itself is suberect; dark red-brown around the mouth. Operculum short conic, 0.1 mm. long. Peristome double, curved inward when dry; the red annulus often conspicuous and persistent. Sporophytes maturing from spring to autumn.

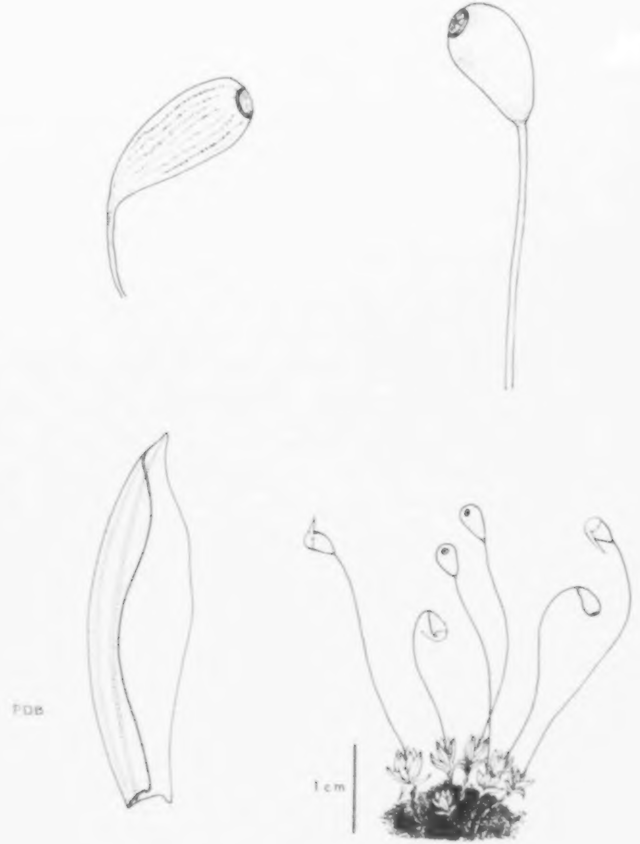
Habitat.—On raw earth in gardens, field margins, roadsides, sites of fires (where it may be abundant), on stone walls.

Similar Species.—Not likely to be confused with any other species; the bulb-like perichætial leaves, the peculiarly oriented capsule and operculum, the strongly grooved capsule, and the distinctive calyptra are all useful key characters.

Distribution in B.C.—Throughout, most abundant in burned-over areas, sites of bonfires, in gardens; a common greenhouse " weed " moss.

Range.—Cosmopolitan throughout the world; not common in polar regions.

Notes.—Sometimes called " cord moss " because of the twisted seta that resembles a cord.



Funaria hygrometrica

Grimmia apocarpa Hedw.

Gametophytes reddish-brown to dark green, forming tufts or mats of half reclining plants attached by base to substrate. Plants irregularly branched, 1–11 cm. long, branches 0.2–0.6 cm. long, sometimes longer, not glossy or crisped when dry, the white hair points of the leaves usually apparent. Stem red. Leaves entire, with recurved margin, tipped by a white hair point, ovate-lanceolate, 2 mm. long, 0.5 mm. wide; costa apparent under transmitted light, forming a keel on the back of the leaf. Perichætial leaves like others, the hair points sometimes longer, completely enclosing the capsule. Calyptra smooth, cucullate, early deciduous.

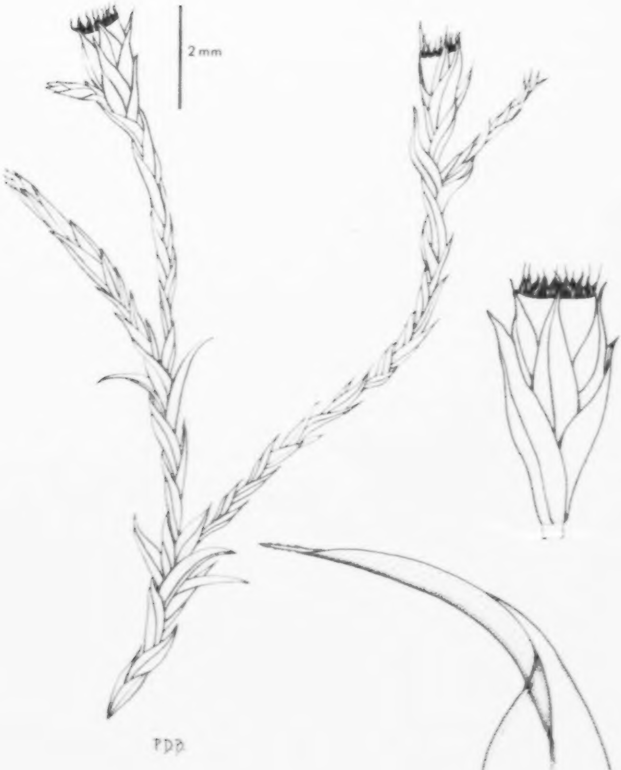
Sporophytes common, terminating the main branches, erect, cylindric, 1.5 mm. long, including operculum, 0.5 mm. wide, red-brown to light brown with a red mouth, not glossy, operculum conic, 0.5 mm. long. Sporophytes often appearing lateral with growth of lower lateral branches. Seta not apparent. Peristome red-brown, flared when dry. Sporophytes maturing in winter; capsules long persistent to the following year.

Habitat.—On rocks, usually in exposed sites, sometimes on stone and brick walls and rocks of rock gardens.

Similar Species.—Might be confused with *Hedwigia ciliata*, but that species has no peristome whatsoever and the perichætial leaves have numerous hairs fringing the margin. *Pseudobraunia californica* has the capsules long exserted on a seta. Other species of *Grimmia* with immersed capsules are not readily distinguished by hand-lens characters. *G. maritima*, a species of seaside rocks, can be identified on the basis of its habitat, although there are many microscopic characters that distinguish it. The *G. apocarpa* treated here is based on var. *stricta* (Turn.) Mitt., which largely replaces the species in the Province.

Distribution in B.C.—Probably throughout.

Range.—Circumboreal in both the Northern and Southern Hemispheres, also in the tropics.



Grimmia apocarpa

Grimmia pulvinata (Hedw.) Sm.

Gametophytes dark green, but appearing greyish with the white hair points, forming dense cushions 0.5–1 cm. deep, not glossy, irregularly to little branched. Stems green to pale brownish. Leaves entire, ovate, 3–5 mm. long, including hair point (1–2 mm. long), 1 mm. wide at base, with recurved margins. Costa forming a ridge on the back of the leaf. Perichætial leaves like others. Calyptra smooth, cucullate, early deciduous.

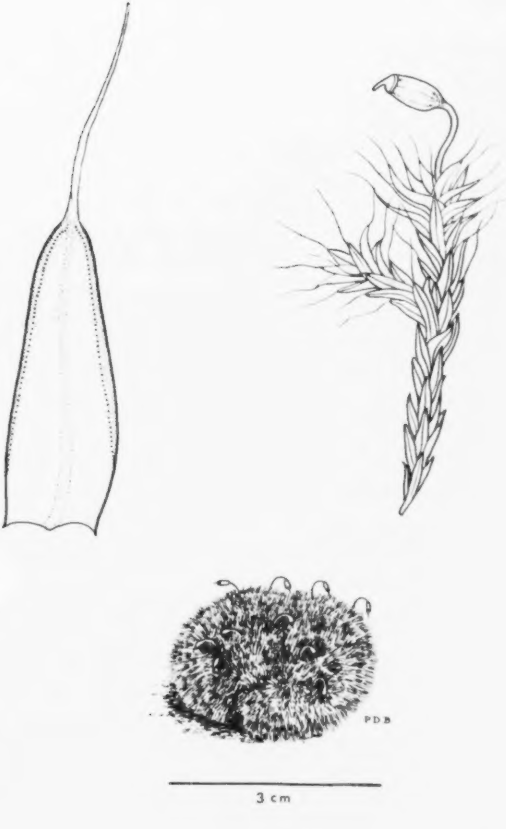
Sporophytes terminating the main stem, the seta usually contorted, often curved like a crook so that the operculum is half buried among the leaves. Seta yellow, 2–3 cm. long, smooth, twisted when dry. Capsule cylindric, dark brown, 2.5 mm. long, including operculum, 0.5 mm. wide, slightly glossy, strongly grooved when dry. Operculum conic to rostrate, curved inward when dry. Sporophytes maturing in spring.

Habitat.—On rocks, cliffs, sometimes on the mortar of stone and brick walls.

Similar Species.—Similar to *G. trichophylla,* from which it is not easily separated on hand-lens characters, although *G. pulvinata* generally forms definite small cushions while *G. trichophylla* usually occurs as turfs or mats. *G. alpestris* might be confused with *G. pulvinata,* but it is a species of crevices rather than from the face of rock, the plants are generally bluish-green, the capsules are erect and not grooved when dry.

Distribution in B.C.—Mainly in south-western B.C., largely near the coast where it is never abundant, also found in the Interior.

Range.—Circumboreal in the southern part of temperate Northern Hemisphere, also in Africa, Australia, and New Zealand.



Grimmia pulvinata

Hedwigia ciliata **(Hedw.) P. Beauv.**

Gametophytes light green to brownish-green, not glossy, not crisped when dry, leaves often somewhat secund, the plants often appearing whitish when dry; plants 1–4 cm. long, little branched, forming reclining mats or tufts, branches 1–1.5 cm. long. Stems red-brown. Leaves entire except at abruptly whitened apical portion where there are small teeth, 2–2.5 mm. long, 0.5 mm. wide, margins recurved. Costa none. Perichætial leaves similar to others, completely surrounding capsule, and with numerous white marginal hairs. Calyptra small, usually not seen.

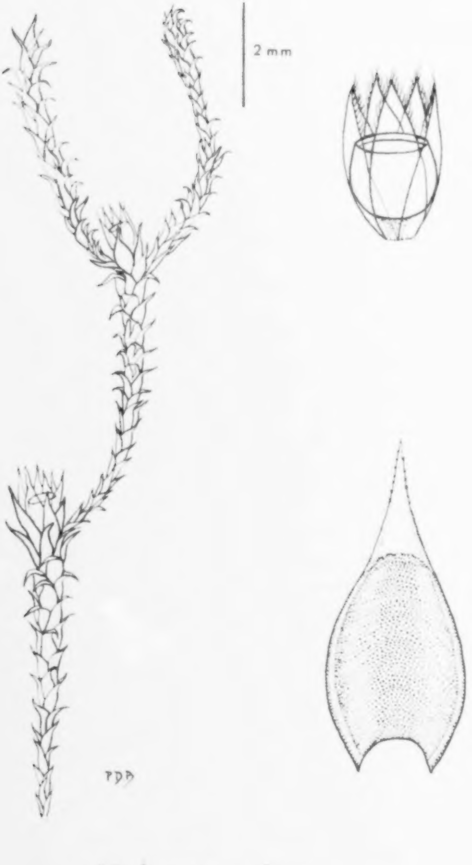
Sporophytes terminating main stem, but usually appearing lateral on a short branch due to the growth of lateral branches from below the main shoot apex. Seta essentially none, not readily visible under a hand-lens. Capsule ovate to nearly spherical, 1 mm. long, 0.7 mm. wide, light brown, red at mouth, smooth. Operculum red-brown, convex and lens-like. Capsule top-shaped when dry, curved inward around mouth; peristome, none. Sporophyte maturing in spring.

Habitat.—On exposed acid rock.

Similar Species.—Might be confused with *Grimmia apocarpa* (*see* note under that species), but it is a distinctive species in its growth form, lack of costa in the leaves, colourless leaf apex, hair-margined perichætial leaves, lack of peristome.

Distribution in B.C.—Probably throughout, particularly on acid rock.

Range.—Circumboreal in the Northern Hemisphere, also widespread in the Southern Hemisphere.



Hedwigia ciliata

Heterocladium heteropteroides **Best.**

Gametophytes dark green to light green, not glossy, much branched, often with the branches twice branched, 1–3 cm. long, sometimes longer, forming creeping mats over substrate, not crisped when dry, leaves sometimes somewhat secund; branches 1–1.5 cm. long, often more. Stems green. Leaves cordate, entire, 0.5 mm. long, 0.2 mm. wide, often less, particularly on branches. Costa obscure even under transmitted light, often double or single and forked near the costa apex. Perichætial leaves glossy, lanceolate with long attenuate apex that is somewhat squarrose, the lower portion of the perichætial leaves sheathing the base of the seta. Calyptra smooth, cucullate, early deciduous.

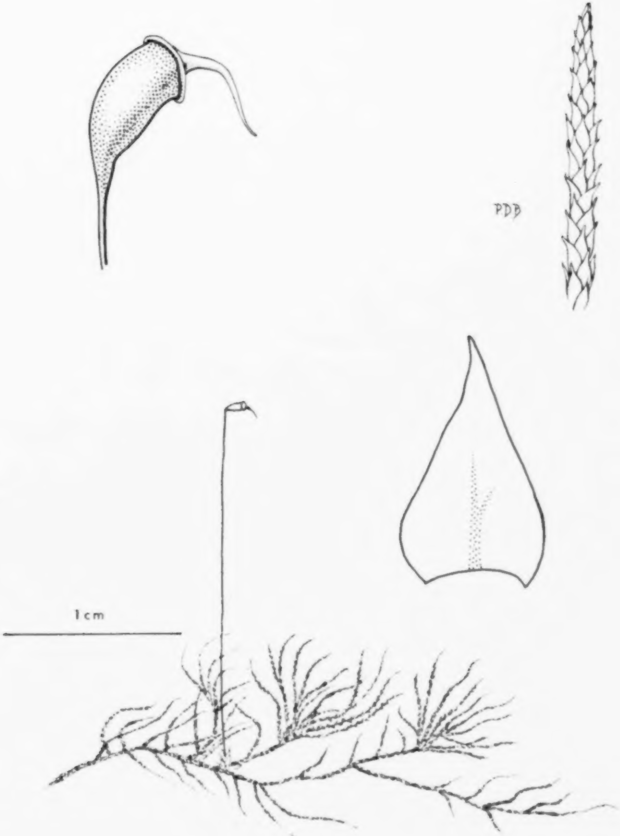
Sporophytes on short perichætial shoots arising well behind the apex of the main shoot. Seta red, smooth, 1–1.5 cm. long, little or not twisted when dry. Capsule inclined, ovoid, dark brown, 1.0–1.2 mm. long, including operculum, 0.5 mm. wide. Operculum rostrate, 0.7 mm. long. Peristome teeth light brown, double, curving inward when dry. Sporophyte maturing in winter.

Habitat.—Usually on boulders or cliffs in shaded sites, sometimes epiphytic on tree trunks.

Similar Species.—Could be confused with *Heterocladium dimorphum,* from which it is not readily separated; the leaves of *H. dimorphum* tend to give the plant a worm-like appearance, the operculum of this species is conic rather than rostrate, often *H. dimorphum* is regularly pinnate, a feature not met in *H. heteropteroides. Claopodium bolanderi* and *C. whippleanum* might be confused with *Heterocladium,* but these species have crisped leaves when dry, among other less obvious distinguishing features. *Leskea polycarpa* has cylindric suberect to erect capsules and the operculum is conic. *Leskeella tectorum* has much smaller leaves (less than 0.1 mm. long in some cases, sporophytes are unknown in this species in North America).

Distribution in B.C.—Largely a Coastal species but probably also in the humid Interior.

Range.—Primarily a Western North American species: Alaska south to California and eastward to Idaho, but also disjunct in the Appalachian Mountains of North Carolina.



Heterocladium heteropteroides

Homalothecium lutescens (Hedw.) Robins.

Gametophytes light green, yellow-green to dark green, glossy, forming mats of extensively creeping much-branched plants 5–17 cm. long, often longer, attached along much of the length by numerous rhizoids. Branches 1–2 cm. or more long. Stems green. Leaves lanceolate, 2–3 mm. long, 1 mm. wide, pleated, appearing entire at 12×, not crisped when dry. Costa barely distinguishable from pleats. Perichætial leaves narrowly lanceolate, not pleated, colourless, sheathing the base of the seta. Calyptra smooth, cucullate, early deciduous.

Sporophytes on short perichætial branches scattered on the main shoot well behind the apex. Seta red, rough, 1–1.5 cm. long, twisted when dry. Capsule suberect light to dark brown, cylindric, 4 mm. long, including operculum, operculum conic, 0.7 mm. long. Peristome teeth light brown, double, incurved when dry. Sporophytes maturing in winter.

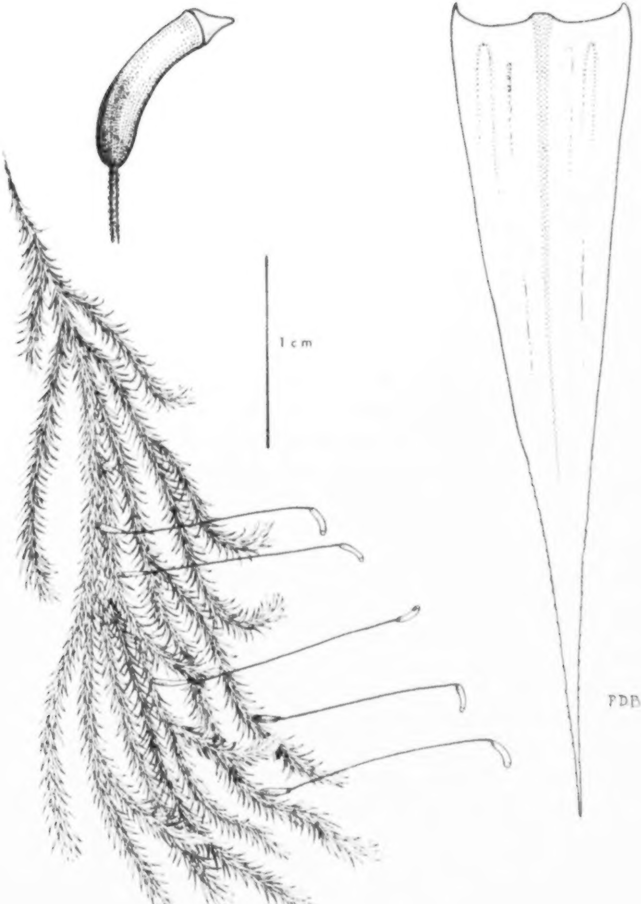
Habitat.—Mainly epiphytic on living trees, also on decaying logs and sometimes on rock.

Similar Species. — Readily confused with *Homalothecium æneum,* from which it may not be distinct. May be confused with *H. nevadense,* from which it is not easily separated on hand-lens characters; its operculum tends to be rostrate rather than conic and the plants never reach the size of *H. lutescens.* Species of *Brachythecium* may also be confused with it, but in this genus the capsules are generally inclined to horizontal.

Distribution in B.C.—Widespread in Coastal regions but also in the humid Interior.

Range.—Europe, Western Asia, North Africa, and Western North America from Alaska to California and eastward to western Montana.

Notes.—The Western North American moss is now generally treated as an endemic, *H. fulgescens* (C. Muell.) Jaeg.



Homalothecium lutescens

***Homalothecium* nuttallii (Wils.) Jaeg.**

Gametophytes light yellow-green, glossy, creeping, forming loose mats over the substrate; if irregularly pinnate-branched, the plants 2–5 cm. long, the branches 1–2 cm. long and the whole plants, including the branches, curled upward when dry, attached to the substrate by rhizoids along the stem. If irregularly branched and pendent, the branches of unequal lengths 2–4 cm. long, sometimes more, not curling upward markedly when dry and infrequently attached along its length, these plants 2–5 cm. long, sometimes longer. Leaves ovate-lanceolate, sharply acute, pleated, 1.5 mm. long, 0.7 mm. wide at base, the margins often with recurved teeth near base and sometimes near the leaf apex, but these rarely visible at 12×. Costa single, not readily distinguishable from the pleats. Perichætial leaves narrowly lanceolate, not pleated, not costate, parallel to base of seta. Calyptra smooth, cucullate, early deciduous.

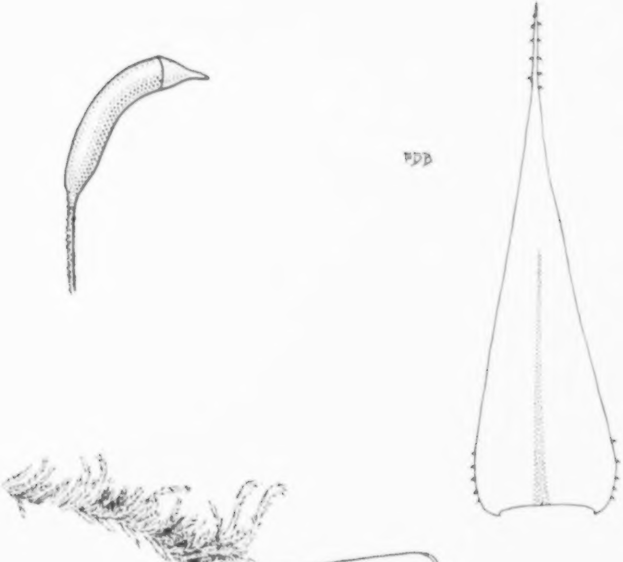
Sporophytes on short lateral perichætial shoots arising well behind the apex of the main shoot. Seta red, rough, 1 cm. long, twisted when dry. Capsule brown, not glossy, suberect, cylindric, 4 mm. long, including operculum, 1 mm. wide, curved, often contracted below mouth when dry. Operculum conic, 1 mm. long. Sporophytes maturing in winter.

Habitat.—Generally epiphytic on trunks and branches of deciduous trees, sometimes on cliffs.

Similar Species.—Not distinguishable from *H. pinnatifidum* on hand-lens characters, although *H. pinnatifidum* grows generally on earth or rock and is regularly pinnate.

Distribution in B.C.—Predominantly a Coastal species but also found in the humid Interior.

Range.—Endemic to Western North America: southern Alaska southward to California and eastward to western Montana.



Homalothecium nuttallii

Hookeria lucens (Hedw.) Sm.

Gametophytes light green to whitish-green, very glossy, complanate, creeping, little branched, 1–5 cm. long, forming flattened mats over the substrate, little changed when dry. Stem dark green. Leaves ovate, 3–4 mm. long, 2 mm. wide, costa none, the leaf cells large and apparent as a meshwork at 12×, margins entire, apex blunt. Perichætial leaves small, lanceolate, forming a cluster at the base of the seta. Calyptra smooth, but of large cells, so appearing rough when dry, cucullate, often persisting on operculum until the capsule is mature and dehisces.

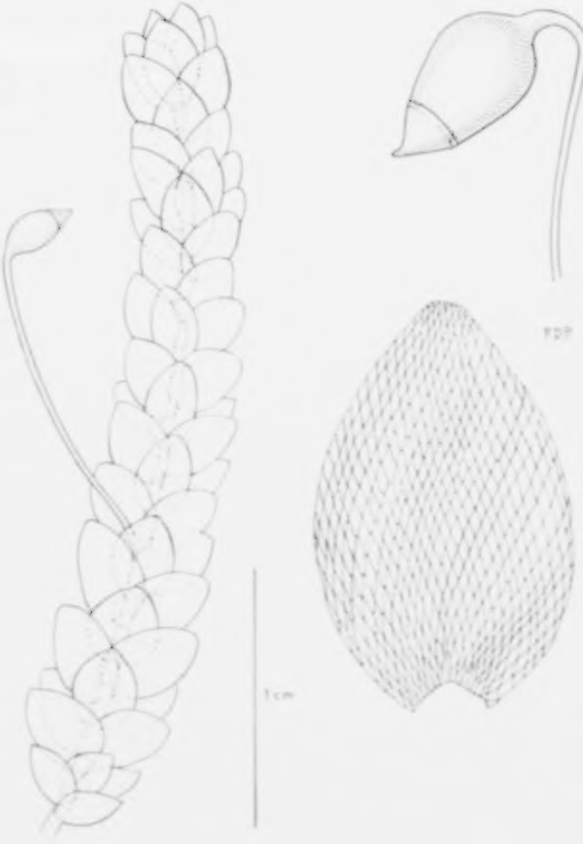
Sporophytes on short lateral perichætial shoots well behind main shoot apex. Seta red, smooth, but appearing vertically wrinkled when dry due to its very large elongate cells, 1–1.5 cm. long, not twisted when dry. Capsule dark brown, not glossy, inclined or nodding, ovoid, 1.5 mm. long, including operculum, 0.5 mm. wide, often contracted below mouth when dry. Operculum conic, 0.5 mm. long. Sporophytes maturing in spring.

Habitat.—On earth, rotten logs, and sometimes submerged in pools of swampy areas, occasionally in bogs, often on organic muck.

Similar Species.—Not likely to be confused with any other moss in the Province except the rare *Hookeria acutifolia* that possesses sharp leaf apices. Might be confused with leafy liverworts, but the complanate, many ranked leaves and the nature of the sporophytes immediately identify it.

Distribution in B.C.—Mainly in the humid forests and swamps near the coast, also in the humid Interior forests.

Range.—Europe and Western Asia, North Africa, and Western North America: Alaska southward to California and eastward to the Purcell Mountains in B.C.



Hookeria lucens

Hygrohypnum luridum (Hedw.) Jenn.

Gametophytes glossy, often forming creeping interwoven mats less than 5 cm. deep, generally pale green, but golden yellow-green in exposed environments; stems 2–10 cm. long, branches irregular on main stem, often few; stem tips often paler green than remainder of plant; older portions of mat dark brown when moist, drying to pale brown. Leaves arranged on stem, giving a braided appearance, leaves falcate-secund, usually less than 0.5 mm. long, costa single or forked near its tip, sometimes double, never conspicuous under a hand-lens; leaf apex acute to bluntish. Perichætial branches usually less than 1 mm. long; perichætial leaves clasping base of seta, often twisted at tips. Calyptra smooth, sheathing upper half of capsule.

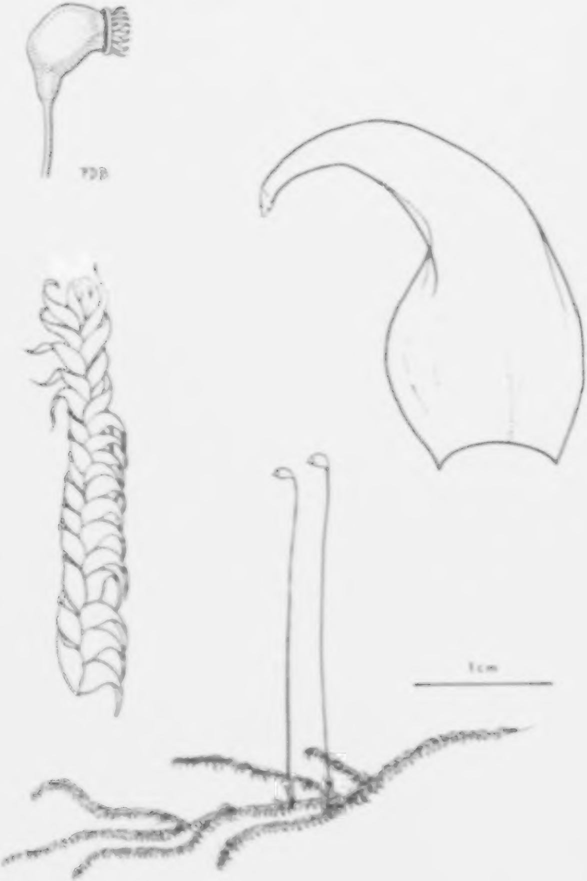
Sporophytes 7–11 mm. tall, including capsule; smooth seta red-brown, twisted when dry; capsule usually less than 1 mm. long, inclined, not glossy, yellowish-brown and constricted below mouth when dry; operculum reddish-brown, short conic, forming about one-fifth of the capsule; capsule stout when mature, about 0.5 mm. in diameter. Sporophytes appearing in mid- to late summer.

Habitat.—Wet rocks and logs in streams and on moist cliff shelves, sea-level to alpine elevations, often forming extensive mats.

Similar Species.—Can be confused with species of *Hypnum*, other species of *Hygrohypnum* and *Drepanocladus*. *Hypnum* species growing in the same environment tend to be pinnately branched and the costa is inconspicuous; the species of *Drepanocladus* have a single costa visible under a hand-lens; it is difficult to distinguish other species of *Hygrohypnum* without resorting to use of a compound microscope.

Distribution in B.C.—Probably throughout the Province, except in the dry Interior.

Range.—Circumboreal: Europe eastward to Siberia and Japan, locally southward to North India and Tibet, North America.



Hygrohypnum luridum

***Hylocomium splendens* (Hedw.) B.S.G.**

Gametophytes dull yellow-green to brownish-green, glossy, creeping, but the annual growth producing arched suberect portions that ultimately become reclining upon the appearance of the next year's growth, thus each year's growth forming a step-like progression of half creeping stems, much branched, each year's series of branches forming an expanding fan-like mass in one plane, thus the plants forming a loose, springy interwoven mat 2–10 cm. deep, with the plants 2–20 cm. long, but the living portion generally less than 3 cm. long. Branching more or less pinnate, with the branches also secondarily branched (sometimes more), never crisped when dry. Stem red, often hairy with numerous paraphyllia. Leaves of main stem ovate, 3 mm. long, 2 mm. wide, with a sinuously twisted apex, costa double, not conspicuous under 12×. Branch leaves ovate, 1–2 mm. long, 0.5 mm. wide, decreasing in size on secondary and tertiary branches, costa double. All leaves entire. Perichætial leaves lanceolate, clustered at base of seta, some squarrose, colourless or yellowish. Calyptra smooth, cucullate, early deciduous.

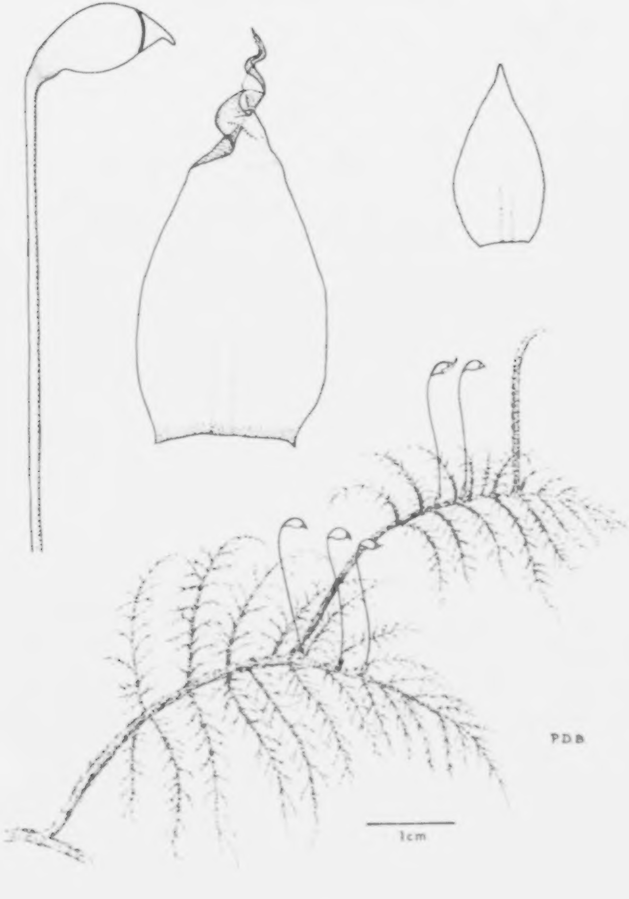
Sporophytes not common, on short lateral perichætial shoots arising on the main stem well behind the apex. Seta red, smooth, 1–1.5 cm. long, not twisted when dry. Capsule inclined, ovoid, brown, not glossy, 3.2 mm. long, including operculum, 1 mm. wide. Operculum conic, 1.2 mm. long. Peristome teeth brown, incurved when dry, double. Sporophytes maturing in spring.

Habitat.—In forests, on boulders, logs, earth, occasionally up bases of trees; sometimes in tundra, often forming extensive mats in coniferous forest.

Similar Species.—Might be confused with *Thuidium recognitum* that has a similar branching pattern, but *Thuidium* plants are not glossy, the leaves have a single costa, are cordate and lack the sinuous apex.

Distribution in B.C.—Probably throughout wherever there is coniferous forest and sometimes into tundra.

Range.—Circumboreal in the Northern Hemisphere, also in Africa and New Zealand.



Hylocomium splendens

Hypnum circinale **Hook.**

Gametophytes light green to dark green, glossy, creeping, regularly pinnate-branched or with irregular unequal branches, 2–7 cm. long, sometimes longer, close to substrate, branches 0.2–2 cm. long. Stem red. Leaves falcate secund, giving the plant a braided appearance. Leaves ovate lanceolate 1–1.5 mm. long, 0.1–0.5 mm. wide at base, falcate with apex much curved, strongly acute, teeth near apex not conspicuous at 12×, otherwise entire, base cordate or unequally cordate. Costa short and double, usually not apparent at 12×. Perichætial leaves lanceolate, clustered at base of seta. Calyptra smooth, cucullate, early deciduous.

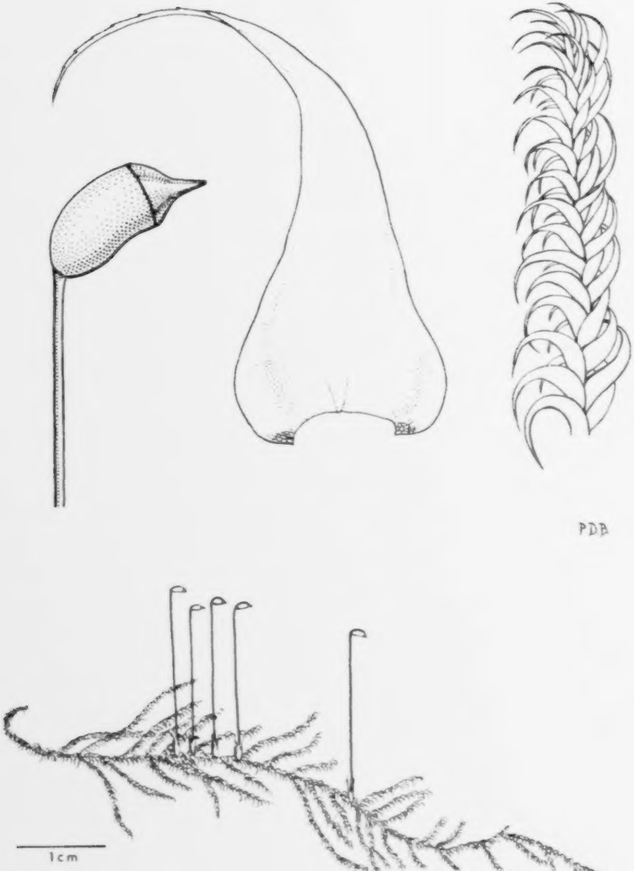
Sporophytes usually numerous, on short perichætial shoots well behind the apex of the main shoot. Seta brown to red, smooth, 0.6–1.5 cm. long, not twisted when dry. Capsule inclined, ovoid, brown, not glossy, 1–2 mm. long, including operculum, 0.7 mm. wide. Operculum conic, 0.5 mm. long. Sporophytes maturing in winter.

Habitat.—Epiphytic on trees, common on decaying logs, sometimes on earth, rocks and cliffs, usually in coniferous forests.

Similar Species.—No other common *Hypnum* has such small capsules and no other genus with falcate-secund leaves is likely to be confused with *H. circinale*.

Distribution in B.C.—Largely a species of the humid Coastal forests but also found in the humid Interior to the western flanks of the Rocky Mountains.

Range.—Endemic to Western North America: from Alaska southward to California and eastward to western Montana.



Hypnum circinale

Hypnum subimponens Lesq.

Gametophytes yellow to golden-green, usually regularly pinnate-branched, creeping over substrate and forming thin mats 2–7 cm. long, branches 2–4.5 mm. long. Leaves strongly falcate-secund, when moist giving the plant a braided appearance; when dry, leaves, stems, and branches curled inward, glossy. Stems yellowish to light brown. Leaves ovate, strongly falcate, with the sharply acute apex strongly curved over, 2.5 mm. long, 0.7 mm. wide at base. Costa double but obscure at 12×. Perichætial leaves lanceolate, clustered at base of seta. Calyptra smooth, cucullate, early deciduous.

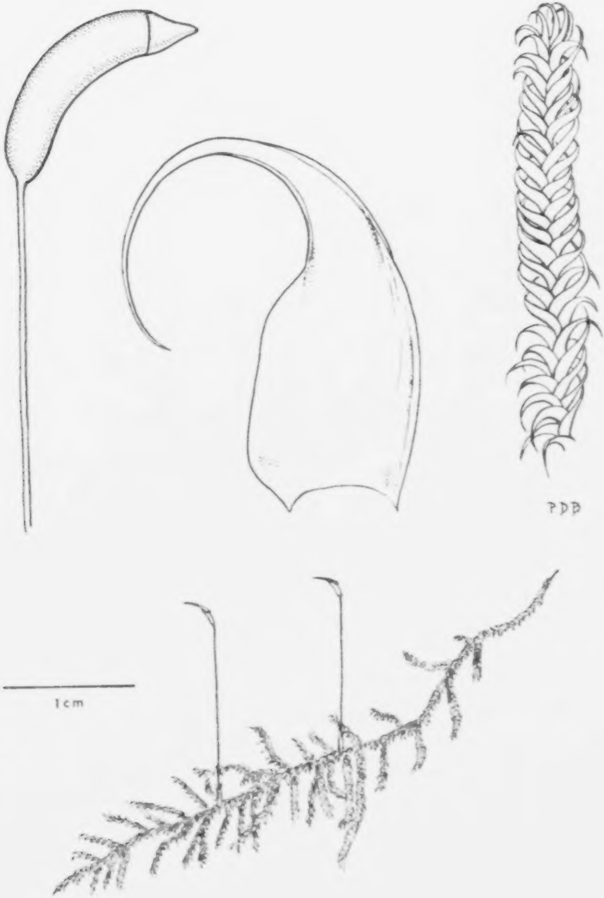
Sporophytes on short perichætial shoots arising well behind the apex of the main shoot. Seta rusty red, smooth, 2–3 cm. long, twisted when dry. Capsule erect or suberect, rusty brown, not glossy, cylindric, 3–4.2 mm. long, including operculum, curved near the mouth, contracted below mouth when dry. Operculum conic, 0.7 mm. long. Peristome yellow, double, curved inward when dry. Sporophyte maturing in spring.

Habitat.—Epiphytic on tree trunks, especially deciduous trees, on logs, on forest floor, boulders, cliff faces, usually associated with coniferous forest.

Similar Species.—When bearing sporophytes this species can be confused with no other species of *Hypnum*. From *Drepanocladus uncinatus* it is distinguished readily since that species has pleated, costate leaves and is rarely regularly pinnate. From *Ptilium crista-castrensis* it is separated by the fact that *Ptilium* plants are usually suberect, the branches arising in one plane, and the capsules strongly inclined (*see* that species).

Distribution in B.C.—Largely a Coastal species in the coniferous forest, but also in the humid Interior to the western slopes of the Rocky Mountains.

Range.—Eastern Asia and Western North America: Alaska southward to California and eastward to western Montana.



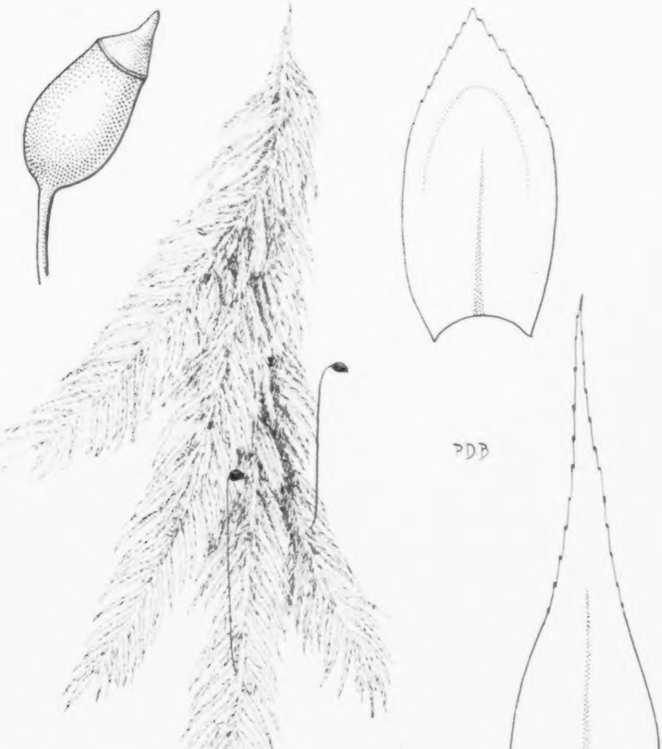
Hypnum subimponens

Isothecium spiculiferum (Mitt.) Ren. & Card.

Gametophytes extremely variable, but always creeping and forming shallow mats over the substrate. Three variations can be recognized. No. 1, *that of exposed rocky sites* tends to be golden yellow-green to yellow-green and glossy, much branched, irregularly pinnate, with both stems and branches worm-like with imbricate leaves when dry, 2–5.5 cm. long, with branches 0.5–1 cm. long. Branches and main stems often curled under when dry. Stem green to yellowish-brown. Leaves variable, in most plants ovate and narrowly acute, teeth near apex visible at 12×, 2 mm. long, 1 mm. wide, in other plants broadly acute, with conspicuous teeth, ovate, 2 mm. long, 1 mm. wide; the branch leaves of this final form are nearly obtuse. In both forms the costa is apparent at 12×. No. 2, *that of boulder faces and bases of trees, usually in humid shaded environments,* tends to be plumose in some cases or densely branched, dark green to golden-green and glossy, 5–10 cm. long, branches 0.5–1.5 cm. long, of nearly equal lengths on the same shoot, not often secondarily branched. Stem greenish to yellowish brown. Leaves divergent when both moist and dry. Leaves ovate-lanceolate, narrowly acute, 3 mm. long, 1 mm. wide, sometimes more, apical teeth obscure at 12× magnification. Costa apparent at 12× magnification. No. 3, *that festooning branches of trees, sometimes on humid cliffs,* where the branches are of unequal lengths, are very long attenuate and form an elongate hair-like mass 5–20 cm. long, sometimes more. The leaves and stem are similar to those of No. 2.

Unfortunately all three variations intergrade and No. 1 closely approaches *I. cristatum,* another species often of similar environments. If names are applied to the variations, No. 1 is generally called var. *myurellum,* No. 2 is called var. *stoloniferum,* and No. 3 is called var. *spiculiferum,* but these names, to be applied accurately, need to be accompanied by microscopic examination of the specimens.

In all three variations the perichætial leaves are lanceolate, are clustered near the base of the seta. The calyptra is smooth, cucullate, and early deciduous.



Isothecium spiculiferum

Sporophytes on short perichætial shoots well behind the apex of the main shoot. Seta dark red, smooth, 0.5–1 cm. long, somewhat twisted when dry. Capsule inclined, red brown, not glossy, ovate to cylindric, 2.1–2.5 mm. long, 0.5 mm. broad, contracted below mouth when dry. Operculum conic, 0.5 mm. long. Peristome yellow, teeth incurved when dry, double. Sporophyte maturing in winter.

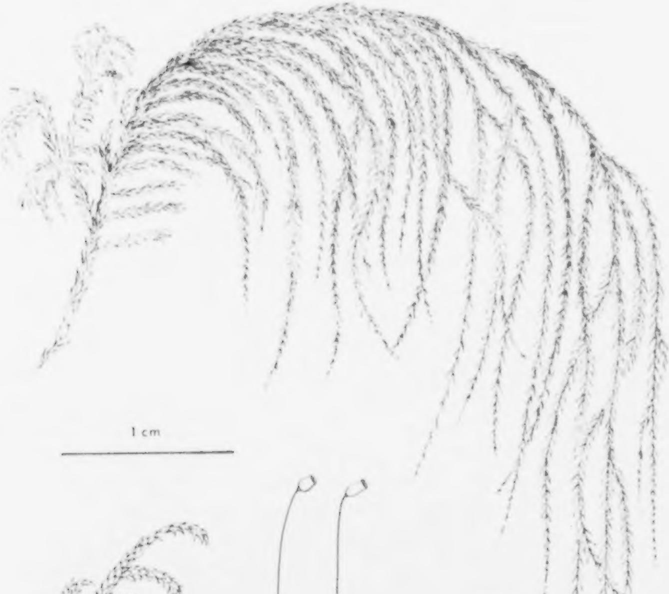
Habitat.—Variable, as noted under gametophytic description: rotten logs, epiphytic on trunks and branches of living trees, on boulders, shaded and exposed cliff faces—largely restricted to the humid Coastal climatic area and associated with coniferous forest or vegetation that precedes closed coniferous forest. In very humid forest it often festoons the branches of trees.

Similar Species.—It is possible to confuse the species with *Scleropodium cæspitosum* and *S. tourretei*, and there are few really reliable hand-lens characters to separate some variants, except the fact that the *Scleropodium* species both have a very rough seta and the capsule is erect to suberect. Many species of *Brachythecium* might be confused with *Isothecium*, and hand-lens characters are insufficient to separate some forms. No *Brachythecium* in B.C. has been noted to form long festooning shoots when epiphytic, and few species are epiphytic. *Homalothecium lutescens* might be confused with variation No. 2, but the leaves of *Homalothecium* are pleated and the capsule is longer, suberect and distinctly cylindric, and normally on a longer seta than *Isothecium*. *Isothecium cristatum* cannot be readily distinguished from variation No. 1 on hand-lens characteristics.

Distribution in B.C.—Primarily a species of the humid Coastal forest region but also in the Arrow Lakes and Kootenay Lake area.

Range.—Endemic to Western North America: Alaska southward to California and eastward to Idaho.

Notes.—Sometimes treated under the name *I. stoloniferum* (Hook.) Brid.



Isothecium spiculiferum

Kiæria starkei (Web. & Mohr) I. Hag.

Gametophytes light green to dark green, somewhat glossy, forming tufts or shallow turfs of short erect relatively unbranched plants 0.5–4.5 cm. deep, somewhat crisped when dry. Leaves falcate-secund, lanceolate, 3–4 cm. long, 0.5 mm. wide, often with nearly subulate apex, margins entire. Costa apparent as a white ridge on the back of the leaf. Stems reddish-brown. Perichætial leaves similar to others but not falcate, parallel to base of seta. Calyptra smooth, cucullate, early deciduous.

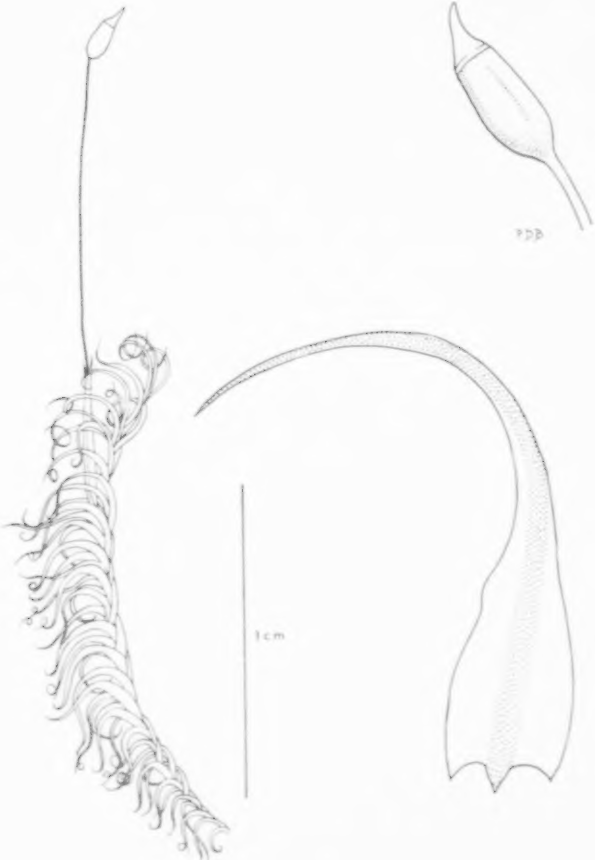
Sporophytes at apex of main shoot. Seta yellow, smooth, 2–2.2 cm. long, strongly twisted when dry. Capsule pale brown, inclined, ovoid, 2 mm. long, 0.2 mm. wide, usually strumose (not shown in illustration), the mouth often oblique to the rest of the capsule when dry. Capsule smooth to irregularly wrinkled when dry, not regularly grooved. Operculum conic to rostrate, 1 mm. long. Peristome red, teeth incurved when dry. Sporophyte maturing in spring.

Habitat.—In alpine and subalpine areas, usually on rock, but sometimes on earth in open plant communities.

Similar Species.—Cannot be readily distinguished from *Kiæria blyttii* on hand-lens characters. *K. falcata* usually has red-brown capsules, but is otherwise similar on hand-lens features. *Dicranella heteromalla* might be confused with *Kiæria*, but the *Dicranella* has the capsules more regularly grooved when dry and occurs on raw inorganic earth rather than rock, the strumose capsule of *Kiæria* also separates it. From *Oncophorus wahlenbergii* it is not easily separated on hand-lens characters, but the leaves of *Oncophorus* are not regularly falcate secund, usually clasp the stem with a broadened base, and are strongly rather than slightly crisped when dry. From *Dicranodontium denudatum* it is most readily distinguished by the brittle deciduous fragmentation of the shoots of the *Dicranodontium*, a feature never present in *Kiæria*.

Distribution in B.C.—Probably on all mountains where subalpine environments are present.

Range.—Circumpolar and circumboreal in mountains of the Northern Hemisphere, also in Southern South America.



Kiaeria starkei

Leptobryum pyriforme **(Hedw.) Wils.**

Gametophytes pale green, glossy, forming loose turfs 0.2–4 mm. deep, unbranched erect plants. Leaves strongly divergent to nearly squarrose at apex of shoot, few; imbricate and distant on lower portion of stem. Stem red-brown in lower portion, green in densely leafy terminal portion. Leaves narrowly subulate, 3–4 mm. long, usually less than 0.1 mm. wide, entire. Costa forming the bulk of the leaf. Perichætial leaves like others. Calyptra smooth, cucullate, early deciduous.

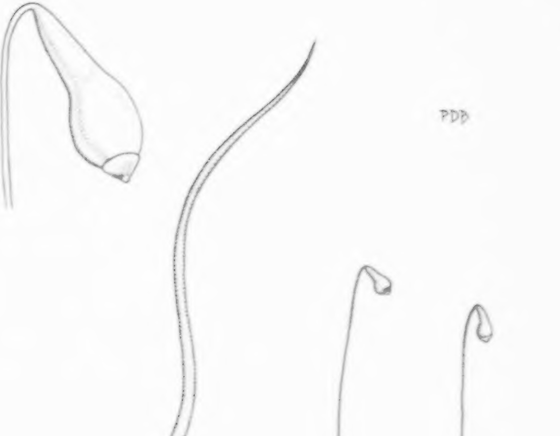
Sporophytes apical on main shoot. Seta red-brown, smooth, 1–3.5 mm. long, sometimes more, not twisted when dry. Capsule markedly pear-shaped with long neck, neck shrunken and often not conspicuous when dry, glossy red-brown, 2–2.5 mm. long, 0.3 mm. wide, nodding. Operculum short conic, 0.5 mm. long. Peristome yellow, double, teeth incurved when dry. Sporophyte maturing in summer.

Habitat.—On disturbed raw earth, frequent on burned-over soil in coniferous forests, a weed of gardens, on concrete of walls.

Similar Species.—Might be confused with *Bryum* or *Pohlia*, but the subulate leaves are absent in these genera, the strongly pear-shaped capsule is not frequent in either of these genera. A very distinctive species, readily determined on hand-lens features.

Distribution in B.C.—Probably throughout, but less common in the Coastal regions than in the Interior.

Range.—Cosmopolitan in both the Northern and Southern Hemispheres.



Leptobryum pyriforme

***Leucolepis menziesii* (Hook.) Steere**

Gametophytes dark green to light green, barely glossy, resembling tiny erect trees with a rounded tuft of branches at the apex of an unbranched shoot, 2–5 cm. tall, forming loose masses. Unbranched stem dark red-brown to nearly black, bearing widely scattered white ovate-lanceolate leaves, 2–3 mm. long, 0.5 mm. wide at base, closely appressed, with conspicuous teeth, an attenuate apex and a reddish base and costa. Branches 1–1.5 cm. long, light red stemmed, leaves imbricate, ovate, 2 mm. long, 0.6 mm. wide at base, with small barely visible marginal teeth and conspicuous costa. Perigonial plants with a cup-like mass at the crown of branches and in the centre, perigonial leaves broadly ovate, 3 mm. long, 2.5 mm. wide, with small teeth and a small apiculus. Perichætial leaves lanceolate, reddish-brown, clasping base of seta. Calyptra cucullate, reddish-brown, smooth, usually early deciduous, sometimes persistent on seta.

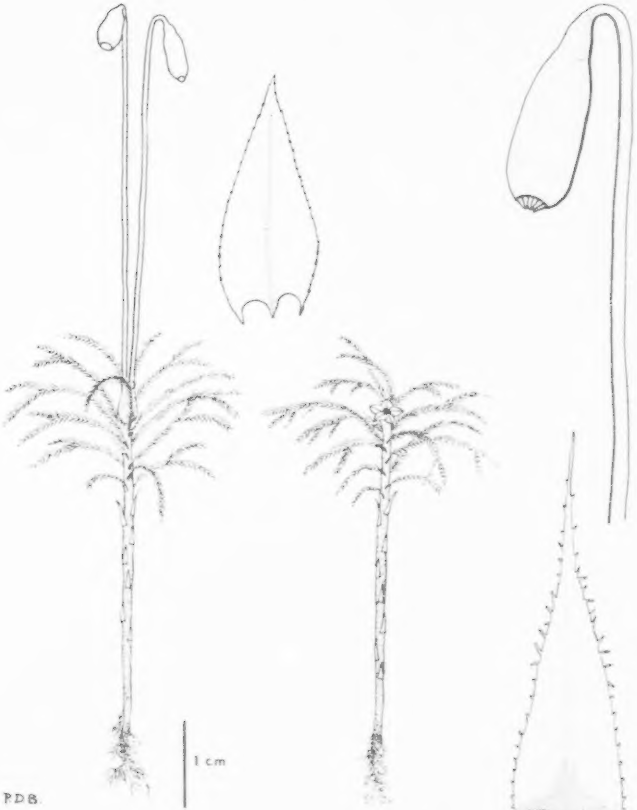
Sporophytes in centre of crown of branches, arising from a perichætium at the apex of the erect shoot. Seta pale red-brown to dark red, smooth, 4–5 cm. long, not twisted when dry. Capsule nodding, pear-shaped, with pronounced neck, red-brown, often yellowish at mouth, 6 mm. long, 1–1.5 mm. wide, not glossy, often more than one sporophyte arising from a perichætium. Operculum short conic, 0.5 mm. long. Peristome dull red-brown, incurved when dry, double. Sporophytes maturing in spring.

Habitat.—Damp or seepy sites, usually shaded, in swamps, near rivers, streams, and lakes, rarely an epiphyte on trees, sometimes on fallen logs.

Similar Species.—Might be confused with *Climacium dendroides* (refer to discussion under that species).

Distribution in B.C.—Predominantly of Coastal forests but also in the humid Interior forests west of the Rocky Mountains.

Range.—Endemic to Western North America: Alaska southward to California and eastward to Idaho.



Leucolepis menziesii

Mnium glabrescens Kindb.

Gametophytes dark green, barely glossy, forming loose masses or turfs of erect unbranched plants, 0.5–2.5 cm. tall, occasionally more. Half-reclining shoots occasional, these with leaves complanately arranged, 0.5–1 cm. long. Erect shoots with small leaves on lower stem, the apex with a rosette of larger leaves. Stem dark red-brown when mature, the lower part heavily clothed in red-brown rhizoids, the rhizoids frequently forming a thin mat over the substrate, from which small half-reclining and erect shoots arise. Leaves elliptic, 4–6 mm. long, 2–3 mm. wide in widest part, entire, with margin of clearly differentiated cells forming a ridge around the leaf, the margin colourless or brownish, as is the conspicuous costa; contorted when dry. Perichætial leaves small and inconspicuous, usually hidden by other leaves, the perichætium at apex of shoot. Perigonial plants similar to the sporophytic plants, but the leaves surrounding a small cup-shaped central mass of antheridia and resembling a flower-like rosette. Calyptra cucullate, smooth, deciduous before the capsule turns brown.

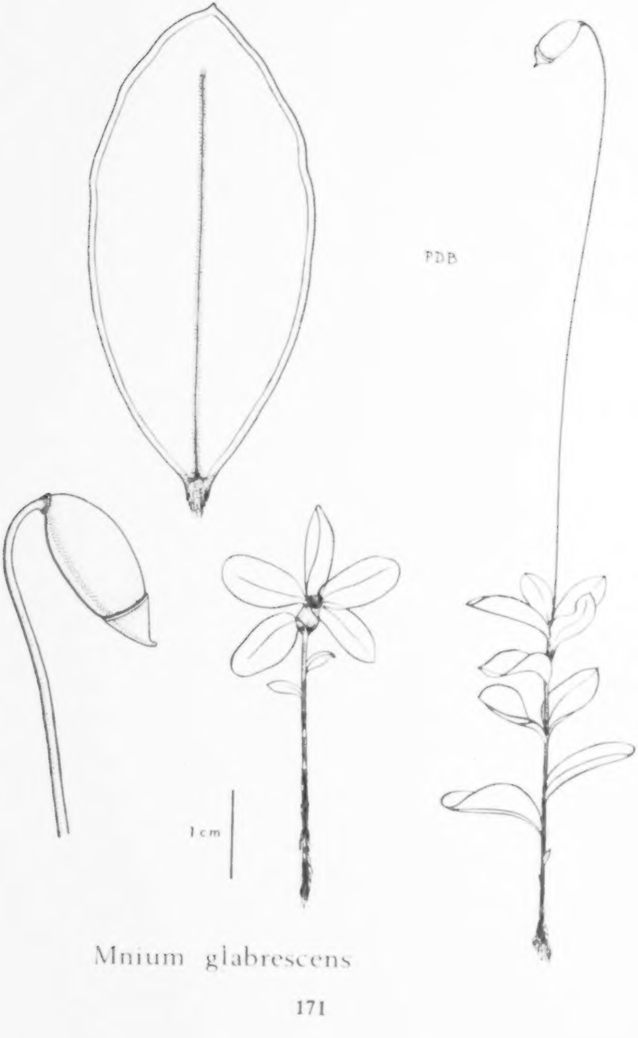
Sporophytes at apex of shoot. Seta red-brown, smooth, 1–5 cm. long, slightly twisted when dry. Capsule nodding, elliptic, smooth, 3–6 mm. long, 0.5–1 mm. wide. Operculum conic, 1 mm. long. Peristome double, the outer teeth yellow, the inner red-brown, incurved when dry and mature. Sporophytes maturing in spring.

Habitat.—Commonly on rotten logs in coniferous forest, but also on the forest floor, on boulders, epiphytic on trees, on stream margins and cliff crevices.

Similar Species.—Readily confused with *Mnium nudum*, in which the leaves are circular rather than elliptic, are very glossy, and not strongly contorted when dry. *Mnium punctatum* is not readily distinguished on the basis of hand-lens characteristics, although the leaves are generally not elliptic and the stem usually has rhizoids among the leaves while *M. glabrescens* does not.

Distribution in B.C.—Very common in the Coastal coniferous forests but also in the humid forests of the Interior.

Range.—Endemic to Western North America: Alaska southward to California and eastward to western Montana. Possibly also in Japan.



Mnium glabrescens

Mnium insigne **Mitt.**

Gametophytes dark green to pale green, barely glossy, of erect, essentially unbranched plants 3–6 cm. tall, stoloniferous shoots arching among the erect shoots 2–5 cm. long, sometimes longer, forming loose turfs. Leaves of the erect shoots forming rosettes at apex of the shoot. Antheridial and archegonial plants often intermixed. Antheridial plants with the apical rosette flower-like around the cup-like mass of antheridia. Archegoniate plants with narrowly lanceolate perichætia surrounding archegonia. Rosette leaves 0.2–1.0 cm. long, 2–3 mm. wide, oblong-ovate, with strongly decurrent base, the leaves diverging from the stem from the apex of the decurrent portion; leaf margin differentiated, forming a narrow colourless ridge around the leaf with conspicuous sharp teeth; apex sharply pointed. Costa obvious, forming a ridge on the back of the leaf, sometimes red-brown. Leaves much contorted and crisped when dry. Stem red-brown, with numerous rhizoids near base. Calyptra yellowish, smooth, cucullate, early deciduous.

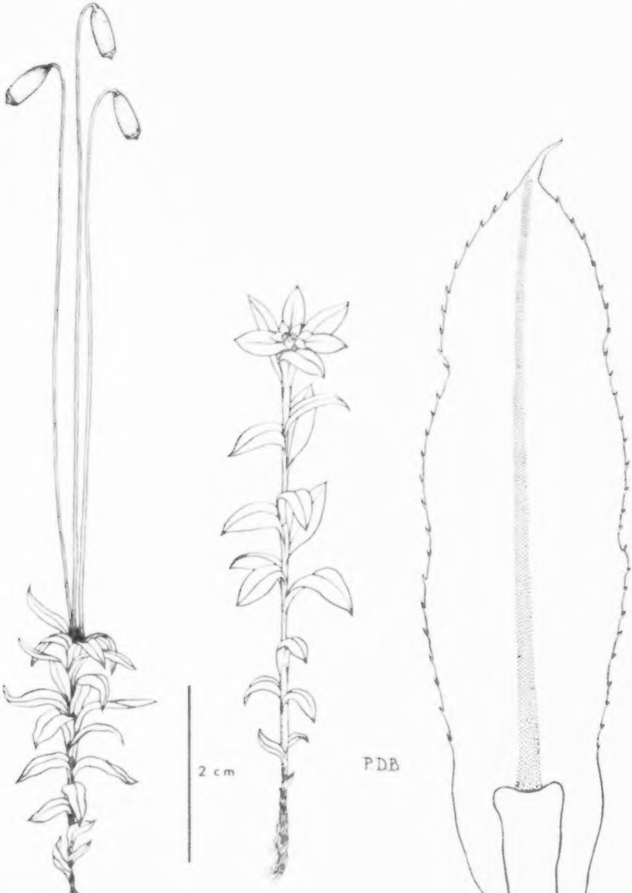
Sporophytes apical on archegonial plants, 2–5 (sometimes more) from each perichætium. Seta red-brown in lower half, grading to pale yellow in upper portion, smooth, 3–4 cm. tall. Capsule nodding, yellow, smooth, not glossy, abruptly differentiated from the seta, cylindric, 3–3.5 mm. long, 1.5 mm. wide, often red-brown at mouth. Operculum short conic, 0.5 mm. long. Peristome double, pale yellow. Sporophytes maturing in spring.

Habitat.—Generally in shaded humid sites; abundant in swampy areas and near water bodies but also in alder-broadleaf maple forest.

Similar Species.—Because of its large size, the numerous sporophytes per perichætium, the strongly toothed decurrent leaves, it is unlikely to be confused with any other moss in the Province.

Distribution in B.C.—Largely Coastal in the humid forest, but extending inland to the forests of the Columbia Mountains and probably to the Rocky Mountains.

Range.—Endemic to Western North America: from Alaska southward to California and eastward to western Montana.



Mnium insigne

Mnium spinulosum B.S.G.

Gametophytes dark green, slightly glossy, of erect unbranched plants, forming a loose turf 1–2 cm. deep. Leaves obovate from decurrent base, 2–2.5 mm. long, 1.5 mm. wide, leaf margin differentiated as a colourless or reddish-brown ridge, with distant sharp teeth in pairs, apex abruptly pointed. Costa obvious, forming a ridge on the back of the leaf, sometimes red-brown. Leaves slightly twisted when dry. Stem red-brown, with rhizoids at base. Perichætial leaves not conspicuous, hidden by other leaves, apical. Calyptra yellowish, cucullate, smooth, early deciduous.

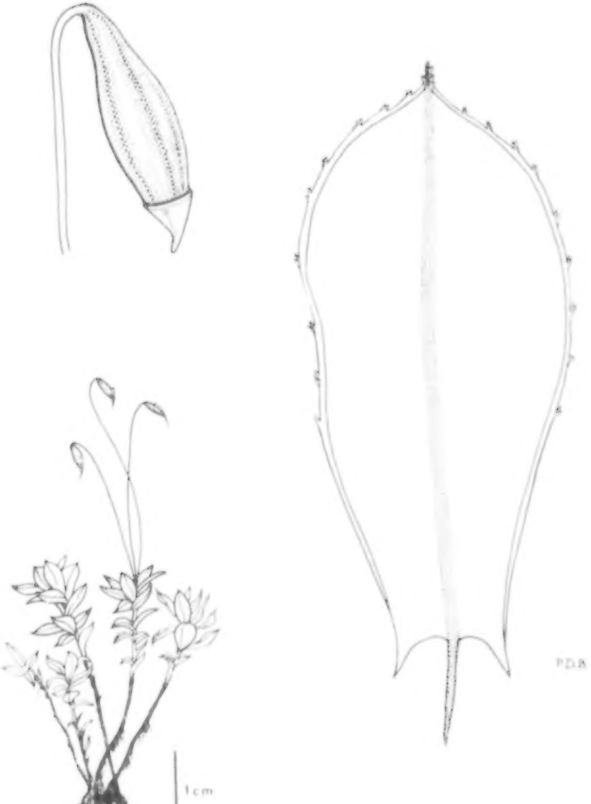
Sporophytes at apex of main shoot, usually 1–2 per perichætium. Seta smooth, red-brown, 1.5 cm. long. Capsule elliptic, tapering to seta, nodding, yellowish, often red-brown at neck, 3 mm. long, 1 mm. wide, not glossy. Operculum conic to rostrate, 1 mm. long.

Habitat.—Generally in humid coniferous forests, on the forest floor, on rocks, and on rotten logs, rarely an epiphyte.

Similar Species.—Might be confused with *Mnium lycopodioides*, but this species has antheridial and archegonial plants, the capsule tapers to the seta, is 5–7 mm. long, and sporophytes are usually uncommon. *M. marginatum* is usually smaller, the leaves generally 1–2 mm. long and strongly crisped and contorted when dry; the capsule also tapers to the seta and normally a single sporophyte emerges from each perichætium.

Distribution in B.C.—Throughout the Province in coniferous forests.

Range.—Throughout boreal North America, Europe, and Western Asia.



Mnium spinulosum

Neckera menziesii Hook.

Gametophytes golden-green to brownish, sometimes dark green, forming barely glossy mats of creeping complanate, pinnately branched plants attached by base to substrate. Frequently with deciduous slender flagelliform branches bearing tiny leaves. Plants 2–1.5 cm. long, sometimes longer, branches variable, 0.5–3 cm. long. Leaves of main stem oblong-lingulate, broadly acute, entire, strongly undulated, 3–4 mm. long, 1 mm. wide; those of branches smaller, but of similar shape. Leaves of flagelliform shoots ovate to ovate lanceolate, acute, 0.2–0.5 mm. long. Antheridial and archegonial plants similar. Perichætia on underside of main stem, usually numerous, perichætial leaves yellowish, lanceolate, never undulate. Stem green to brownish, paraphyllia numerous but not conspicuous at 12× magnification. Calyptra smooth, cucullate, early deciduous.

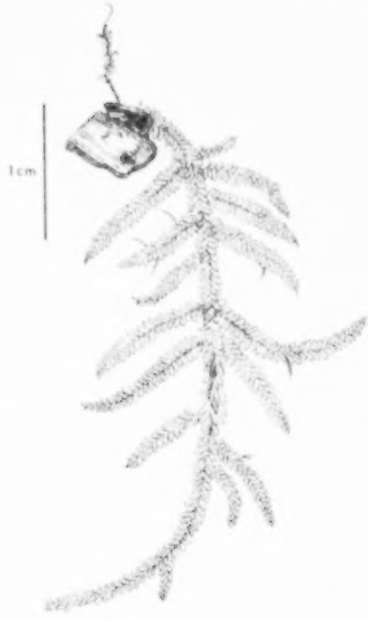
Sporophytes numerous, immersed among perichætia, seta inconspicuous. Capsule cylindric, 3 mm. long, including operculum, dark brown, slightly glossy; operculum 1 mm. long, conic. Capsules nearly parallel with main stem. Peristome double, red-brown. Sporophytes maturing in winter.

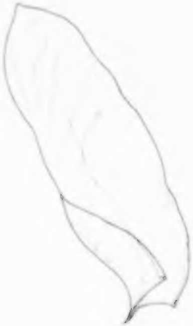
Habitat.—Epiphytic, pendent particularly on deciduous tree trunks (maple, poplar, apple, etc.) but sometimes on cedar, also on cliffs, particularly those of limy rock.

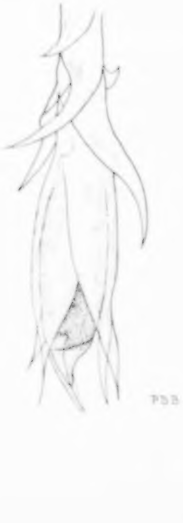
Similar Species.—From *Neckera douglasii* this species can be readily distinguished by its colour, golden to dark green rather than light glossy green; the capsules of *N. douglasii* have a conspicuous seta. From *N. pennata* it can be distinguished also on the basis of the strong glossiness of *N. pennata* and the more sharply acute leaves of that species.

Distribution in B.C.—Frequent in Coastal forests, but also extending eastward to the Rocky Mountains.

Range.—Common in Pacific North America from Alaska southward to California and eastward to Montana; also in Mediterranean Europe; Asia and Africa; local in Japan.







Neckera menziesii

Oligotrichum aligerum **Mitt.**

Gametophytes dark red-brown to dark green, not glossy, forming loose turfs of erect plants 0.5–2.5 cm. tall. Stem dark brown. Leaves lanceolate from a broad base, 1–2 mm. long, 0.75 mm. wide at base, the costa and the widened base with sinuous lamellæ (obscure at 12×). Leaf margin with teeth, especially near apex, entire on the broadened base, the tip generally incurved or crisped when dry. Antheridial plants forming relatively pure colonies, similar to archegonial plants except for the prescence of an apical cup-shaped mass of broad perigonial leaves (1–2.5 mm. wide, 1.5–2 mm. long) that lack lamellæ. Perichætial leaves of archegoniate plants 2–3 mm. long; crisped when dry. Calyptra with few hairs near apex, early deciduous.

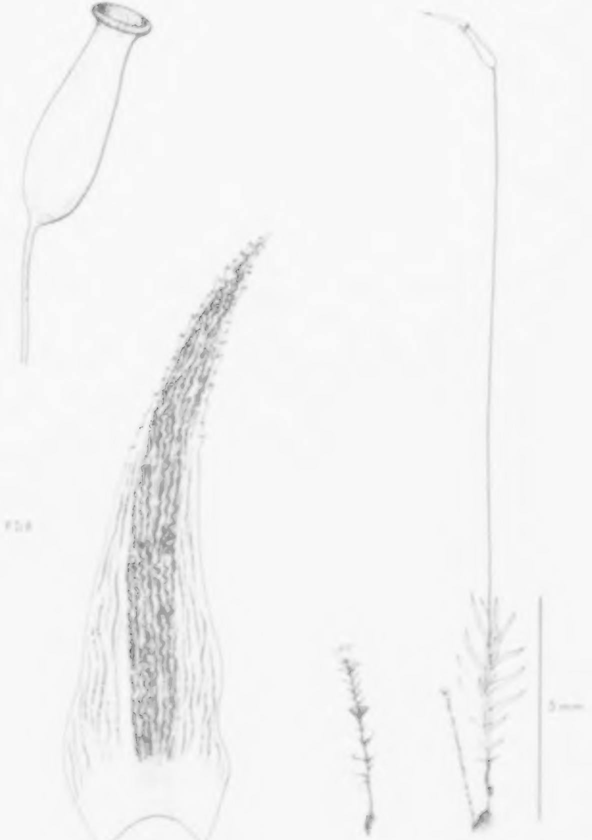
Sporophytes usually arising singly from an apical perichætium, the seta smooth, barely glossy, reddish, 3–4 cm. long. Capsule erect to slightly inclined, cylindric but narrowed from the base toward the apex, then flaring at the mouth, 3–4 mm. long, 1 mm. wide, light green to yellowish-green, generally with obscure longitudinal ridges when dry and mature, not glossy. Operculum conic, 1 mm. long. Peristome teeth white, incurved over the parchment-like epiphragm that covers the mouth. Sporophytes maturing in spring.

Habitat.—Disturbed sites on raw inorganic earth of sunny localities, commonest at subalpine elevations, but also to sea-level.

Similar Species.—Cannot be distinguished from *Oligotrichum hercynicum*, an alpine species, without microscopic examination. It is unlikely to be confused with any other moss, except *Pogonatum*, which possesses rather glaucous leaves and a hairy calyptra.

Distribution in B.C.—Most frequent on the Coast but present in high mountains throughout most of the Province.

Range.—Western North America from Alaska southward to California and east to the Rocky Mountains, also present in Eastern Asia.



Oligotrichum aligerum

Oncophorus wahlenbergii Brid.

Gametophytes light green to nearly black, forming loose turfs of erect plants 0.5–2 cm. deep, glossy. Stem red-brown, completely encased in sheathing leaf bases. Leaves strongly crisped when dry, subulate from an ovate clasping base, 4–5 mm. long, 1 mm. broad at base, abruptly tapering from the clasping portion into the subulate apex, marginal teeth not apparent at 12×; costa distinct, forming a rounded keel to the leaf. Perichætial leaves similar to others. Calyptra cucullate, smooth, early deciduous.

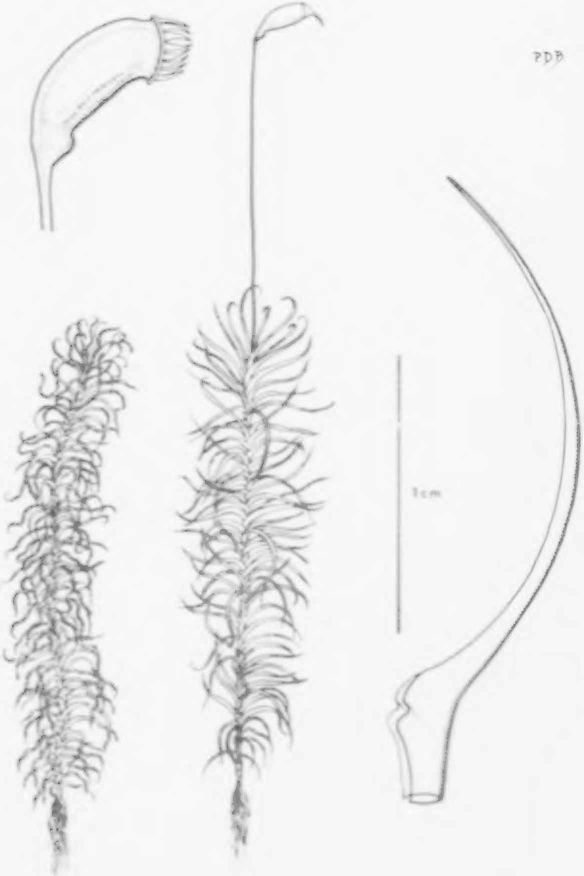
Sporophytes generally one per erect shoot, apical, but appearing lateral before the spores are shed. Seta smooth, light yellow to brownish, twisted when dry, glossy, 1–2 cm. long. Capsule inclined, ovate, 1 mm. long, 0.5 mm. wide, strongly strumose and tapering to the seta, light brown, not glossy. Operculum conic, 0.5 mm. long. Peristome red-brown, the teeth incurved when dry. Sporophytes maturing in summer.

Habitat.—Frequent on rotten logs, sometimes on soil, usually in wet locations near streams.

Similar Species.—Might be confused with some species of *Dicranella*, but the strumose capsule and abruptly subulate leaves clearly separate the *Oncophorus*. From *Oncophorus virens* it is distinguished with difficulty without microscopic examination, but *O. virens* does not possess the subulate leaf apices.

Distribution in B.C.—Probably throughout except in the southern Coastal area and in non-forested dry regions; commonest in the boreal forest in the northern part of the Province and in the Rocky Mountains and adjacent ranges.

Range.—Circumboreal in the Northern Hemisphere.



Oncophorus wahlenbergii

Orthotrichum lyellii Hook. & Tayl.

Gametophytes dark to light green, sometimes reddish-brown, forming loose roundish cushions, not glossy, the shoots 3–5 cm. long. Leaves closely imbricate when dry, spreading when wet, lanceolate, 4–6 mm. long, 1 mm. wide at base, tapering gradually to apex, entire, costa forming evident keel on back of leaf. Perichætial leaves like others, lateral, especially with growth of the shoot before the capsule matures. Antheridial plants similar, in separate cushions. Calyptra bell-shaped, with erect hairs, covering one-half to two-thirds of the capsule.

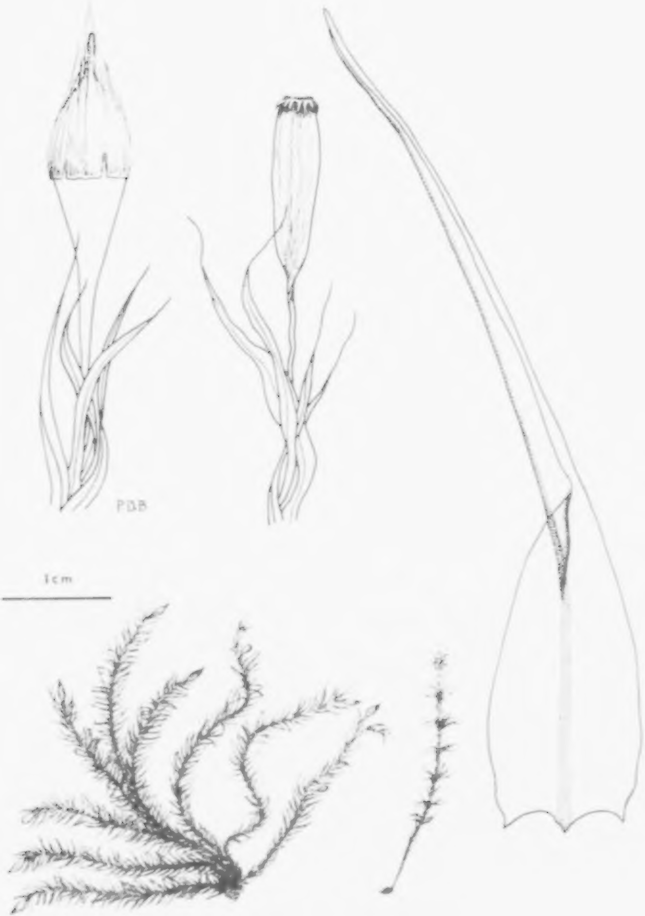
Sporophyte lateral when mature, slightly emergent from the perichætial leaves, light brown when mature, cylindric, strongly grooved, 2–3 mm. long, 0.5 mm. wide, seta straight, 1–1.5 mm. long, smooth. Operculum short conic, 0.5 mm. long. Peristome double, outer teeth reflexed against the upper part of the capsule, inner curved inward. Sporophytes maturing in spring.

Habitat.—On deciduous trees, particularly alder, maple, and oak.

Similar Species.—When mature this species can be readily distinguished from any other *Orthotrichum* on the basis of its loose habit and the long gradually tapered leaves. It is unlikely to be confused with any other genus. There are many other species of *Orthotrichum* in the Province, many on rock.

Distribution in B.C.—Essentially Coastal, following the range of red alder northward to the Queen Charlotte Islands and the rivers inland; possibly not east of the Coast Mountains.

Range.—Pacific North America, from B.C. southward to California, also in Europe and North Africa.



Orthotrichum lyellii

Philonotis fontana (Hedw.) Brid.

Gametophytes forming tall turfs of light yellowish-green, non-glossy erect plants, some with a tuft of branches at the apex of the shoot, 3–6 cm. tall, the branches 2–5 mm. long. Shoots closely enmeshed by red-brown rhizoids. Antheridial shoots with apical cup of larger leaves with flared apices to form a flower-like mass, antheridia light brown. Most leaves broadly to narrowly ovate, 1–1.5 mm. long, 0.5–1 mm. wide at base, margins not noticeably toothed at 12×; costa apparent as a ridge on the leaf back. Perichætial leaves not different from others. Calyptra smooth, early deciduous.

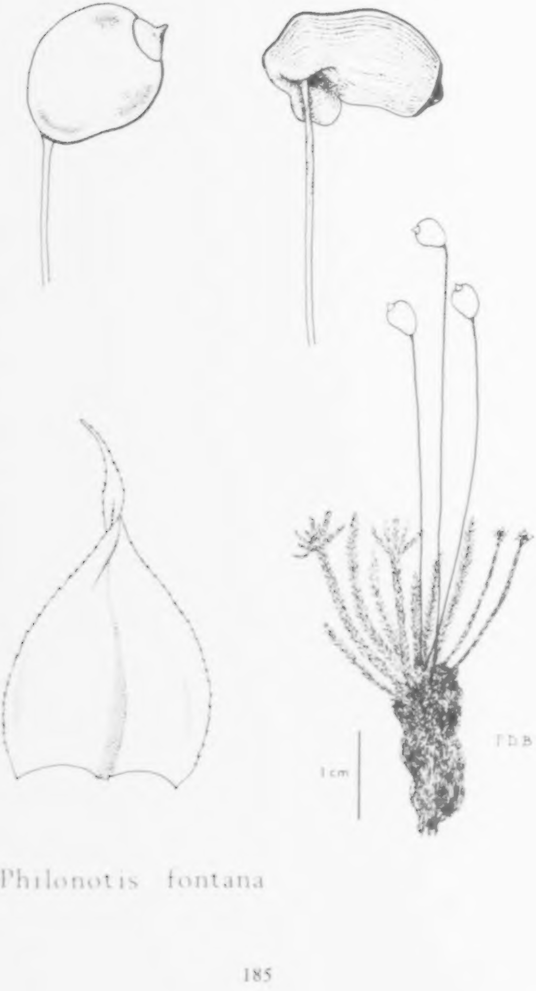
Sporophytes arising from apex of shoot, but deeply buried in the turf of plants before maturing. Seta smooth, glossy, red-brown, twisted when dry, 2–5 cm. long, often rather crooked. Capsule almost spherical when green, inclined, 2 mm. long, 1.5–2 mm. wide, dark brown, distorted, and strongly and closely grooved when dry and mature. Operculum short conic, less than 0.5 mm. long. Peristome double, the outer teeth apparent and incurved when dry. Sporophytes maturing late spring to summer.

Habitat.—Generally in seepy or springy localities, generally sunny, where it may form extensive colonies.

Similar Species.—When with capsules unlikely to be confused with any other genus, but many of the species are difficult to distinguish even with microscopic examination.

Distribution in B.C.—Throughout wherever the habitat is available.

Range.—Ubiquitous in the Northern Hemisphere, particularly in boreal and arctic regions.



Philonotis fontana

Plagiothecium denticulatum **(Hedw.) B.S.G.**

Gametophytes forming thin pale glossy green creeping mats, irregularly branched, complanate, 3–6 cm. long with branches 0.8–1 cm. long or longer. Stem green. Leaves ovate to ovate-lanceolate, 2–3 mm. long, 0.5–1 mm. wide near base, costa double but obscure and often appearing single at 12×, margins entire at 12×. Perichætial leaves pale green, lanceolate, clasping base of seta, perpendicular to creeping plant. Calyptra cucullate, smooth, early deciduous.

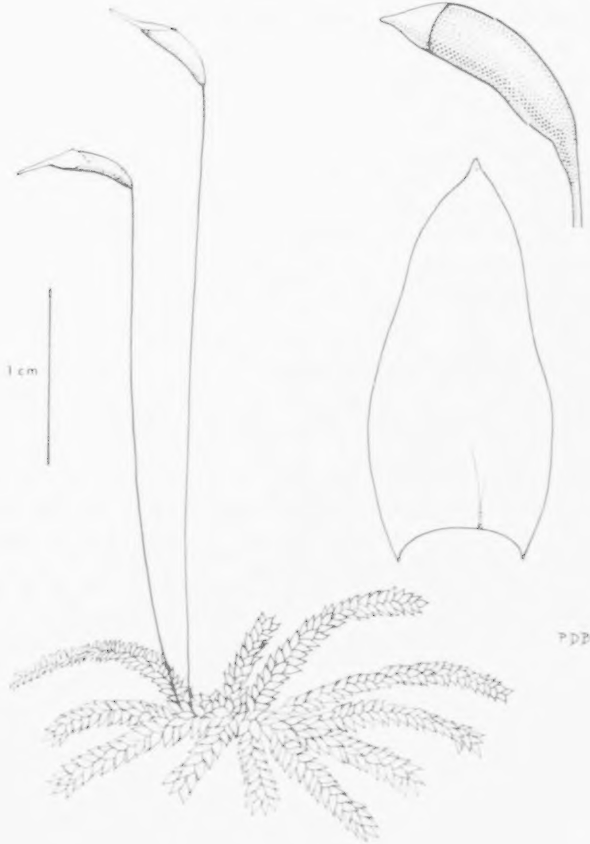
Sporophytes arising singly from each lateral perichætium, seta red-brown, glossy, smooth, perpendicular to creeping plant, 1.5–2 cm. long, often somewhat twisted when dry. Capsule brown, inclined, curved, cylindric, 2 mm. long, 0.75 mm. wide, sometimes somewhat grooved, contracted below the mouth when dry. Operculum conic, 0.5 mm. long. Peristome double, yellow-brown, incurved when dry. Sporophytes maturing in spring.

Habitat.—On earth, rotten logs, and humid cliffs, sometimes in swamps and subalpine heaths.

Similar Species.—Might be confused for *P. ræseanum*, which tends not to be complanate and is often tufted rather than forming mats. The genus *Neckera*, which might be confused with it, generally possesses undulate leaves; the capsules are never grooved and are never curved. *Porotrichum bigelovii*, which may resemble this species, has the leaves almost two-ranked instead of clearly overlapping on the surface of the leaf; they are also strongly costate. It is difficult to distinguish *Plagiothecium lætum* from *P. denticulatum* using hand-lens features.

Distribution in B.C.—Probably throughout wherever coniferous forest is present.

Range.—Througout the temperate portion of the Northern Hemisphere, also probably widespread in temperate portions of the Southern Hemisphere (New Zealand, Peru, etc.).



Plagiothecium denticulatum

Plagiothecium elegans (Brid.) Sull.

Gametophytes forming thin complanate creeping mats, light to yellowish green, glossy, irregularly branched, 1–4 cm. long, branches 1–2 cm. long. Stem reddish to green. Leaves ovate, 1 mm. long, 0.5 mm. wide at base, double costa obscure at 12× magnification, confined to base, margins appearing entire at 12×. Axillary flagelliform gemmæ often abundant, these yellowish and readily deciduous. Perichætial leaves obscure, hidden by normal leaves. Calyptra smooth, early deciduous.

Sporophytes arising one from each lateral perichætium, the seta perpendicular to the creeping gametophyte. Seta red-brown, smooth, glossy, twisted when dry, 1.5–2 cm. long. Capsule cylindric, red-brown, not glossy, nodding, 1 mm. long, 0.5 mm. wide, somewhat contracted below mouth. Operculum conic, 0.5 mm. long. Peristome double, the teeth whitish and incurved when dry. Sporophytes maturing in early summer. Sporophytes not frequent.

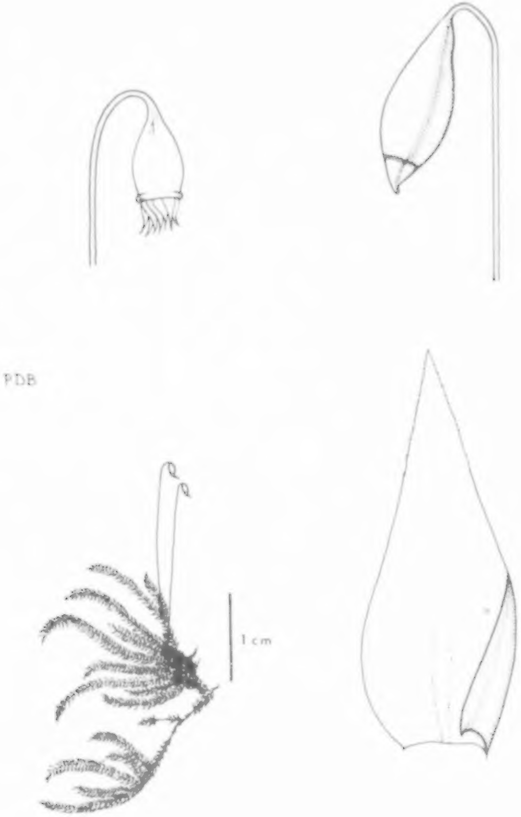
Habitat.—On raw earth, humus, rocks, sometimes on rotten logs and on the base of tree trunks, generally in humid coniferous forests.

Similar Species.—Not likely to be confused with any other moss when bearing mature capsules. The nodding capsules are uncommon in feather mosses in the Province. When sterile it can be confused with a number of species of *Plagiothecium, Isopterygium,* and some species of *Hypnum,* as well as other feather mosses.

Distribution in B.C.—Throughout the humid coniferous forests, particularly west of the Coast Mountains, but also in the eastern mountains. Probably absent in the north-eastern part of the Province.

Range.—In both Eastern and Western North America, but missing from the central States and Provinces, also in Europe.

Notes.—Now generally called *Isopterygium elegan*s (Hook.) Lindb., differing from *Plagiothecium* in a number of critical characters.



Plagiothecium elegans

Plagiothecium undulatum (Hedw.) B.S.G.

Gametophytes forming creeping mats of complanate shoots, pale whitish-green, somewhat glossy, irregularly branched, 1–6 cm. long, the branches 1–3 cm. long, sometimes longer. Stem pale green. Leaves undulate, ovate, tapering to broadly acute apex, 2–3 mm. long, 1–1.5 mm. wide near base; costa double, obscurely visible at 12×, confined to near leaf base. Leaf margins entire. Perichætia lateral, the leaves lanceolate, colourless, clasping base of seta. Calyptra cucullate, smooth, early deciduous.

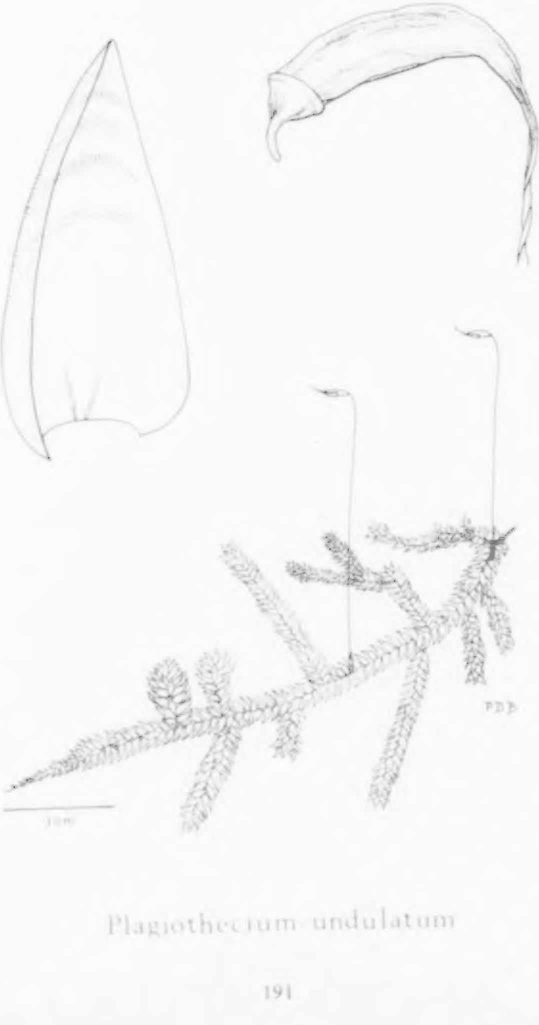
Sporophytes lateral, perpendicular to the creeping mat, arising on main stem. Seta smooth, glossy, reddish, twisted when dry, 4–5 cm. long. Capsule inclined, cylindric, dark brown and regularly grooved when dry, sometimes contracted below mouth, 3–3.5 mm. long, 0.5 mm. wide. Operculum conic, 1 mm. long. Peristome double, pale brown to yellowish, the outer teeth flaring outward when dry. Sporophytes maturing in spring.

Habitat.—Generally in humid coniferous forest, on logs of the forest floor and sometimes on rocks.

Similar Species.—Unlikely to be confused with any other species when bearing sporophytes. The whitish-green complanate gametophytes with undulate leaves and bearing capsules that are regularly grooved when mature are characteristic only of this moss in the Province.

Distribution in B.C.—A common species in the humid Coastal coniferous forests and possibly not east of the Coast Mountains.

Range.—Pacific North America from Alaska southward to California, also in Europe and Western Asia.



Plagiothecium undulatum

Pleurozium schreberi (Brid.) Mitt.

Gametophytes forming thick mats of creeping or suberect regularly pinnate-branched plants 10–15 cm. long, the branches 1–1.5 cm. long, shorter near tip, glossy yellow-green to dull green, the stems red-brown. Leaves ovate, 2–2.5 mm. long, 1–1.2 mm. wide near base, the alar regions red-brown and conspicuous at 12×, the double costa not conspicuous at 12×, margins entire. Perichætial leaves lanceolate, clasping base of seta. Calyptra cucullate, smooth, early deciduous.

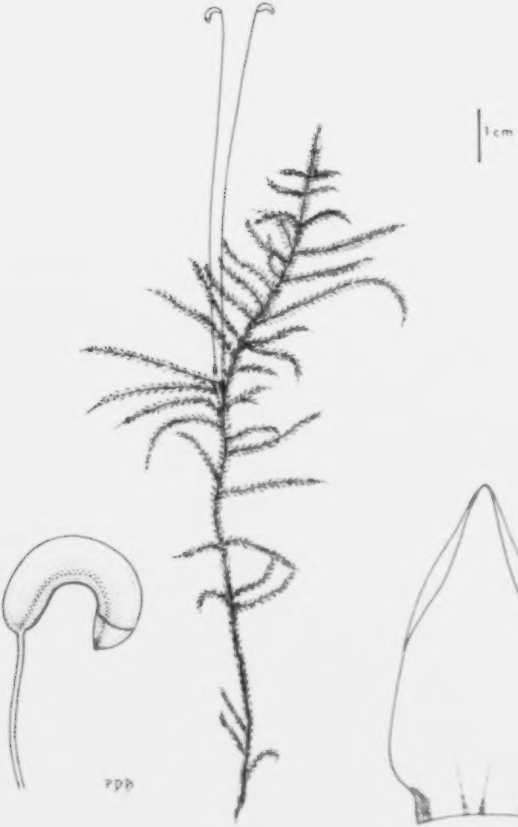
Sporophytes arising singly from each perichætium, the perichætia lateral on main shoot, often absent in extensive colonies of the species. Seta red-brown, smooth, somewhat glossy, 3–4 cm. long, somewhat twisted when dry. Capsule cylindric, horizontal and often curved, 2 mm. long, 1 mm. wide. Operculum conic, 0.5 mm. long. Peristome double, red-brown. Sporophytes maturing in summer.

Habitat.—Generally in coniferous forests, particularly those on poor soils, also on open cliff terraces; sometimes in bogs.

Similar Species.—Might be confused with *Calliergonella cuspidata,* but that species generally lacks the red-brown stem and is generally less regularly pinnate and grows in wet or seepy habitats. Species of *Calliergon* might also be confused with it, but in most of these the costa is single and apparent at 12× and most species are irregularly pinnate or little branched and grow in very wet sites. *Entodon concinnus* is distinguishable largely on the basis of its green rather than red-brown stem, a feature that also separates *Pseudoscleropodium purum.* The *Pseudoscleropodium* has a single costa.

Distribution in B.C.—Probably throughout wherever coniferous forest is found.

Range.—Circumpolar in the Northern Hemisphere, also in Ecuador and Peru.



Pleurozium schreberi

Pogonatum contortum (Schwaegr.) Sull.

Gametophytes dark green, not glossy, of unbranched erect shoots forming loose turfs of rigid plants 5–12 cm. tall. Stems red-brown, leaves confined to upper portion of shoot, deciduous below; leaves arching outward from the stem when moist; strongly contorted inward when dry; rhizoids forming roundish mass at base of stem. Leaves broadly lanceolate, 4–9 mm. long, 1 mm. wide or less, margins plane and conspicuously toothed, lamellæ conspicuous at 12×, covering most of upper part of leaf. Costa forming inconspicuous ridge on back of leaf; lower portion of leaf, below lamellæ, largely colourless. Perichætial leaves similar to others; perigonial leaves shorter and broader, forming apical cup-like perigonium, often tawny to brownish; perigonial plants in separate colonies or mixed with others. Calyptra whitish to tawny, completely sheathing erect capsule, conspicuously hairy, 4–5 mm. long, dehiscent before the operculum.

Sporophytes at apex of main shoot, occasionally appearing lateral due to growth of the stem which branches at same level as base of seta. Seta red-brown to dark brown when mature, glossy, somewhat twisted when dry, 1–4.5 cm. long, wiry. Capsule cylindric, dark brown when mature, not glossy, contracted below strongly flaring mouth, 3–4 mm. long (including operculum) and 1 mm. wide, operculum with distinct central snout; epiphragm paper white. Peristome teeth red-brown, glossy, incurved over epiphragm. Sporophytes maturing in winter to early spring.

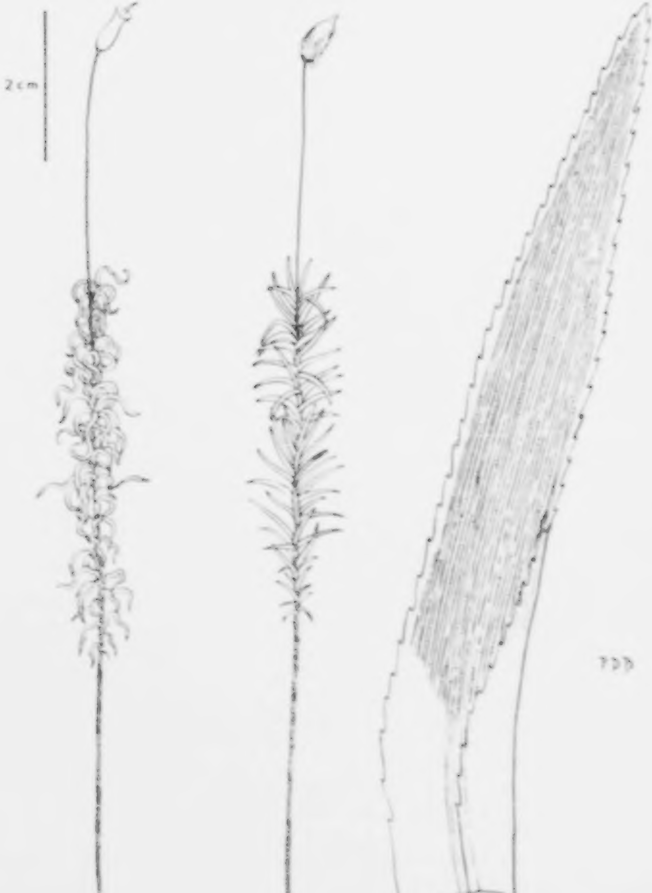
Habitat.—Raw earth, generally stream banks or roadsides and in disturbed areas (earth-slides, overturned tree roots), generally in open habitats.

Similar Species.—Might be confused with *Oligotrichum parallelum*, from which it differs by the coarser leaves, more conspicuous lamellæ (*Oligotrichum* lamellæ often barely apparent), and in the fact that *Oligotrichum* has an essentially hairless calyptra. From *Atrichum selwynii* it can be distinguished by similar characters (*Atrichum* also has a hairless calyptra, inconspicuous lamellæ), and *Atrichum* has the leaves undulate while those of the *Pogonatum* are always plane. Compare also with other species of *Pogonatum*.

Distribution in B.C.—Widespread in the Coastal forests but also found in the coniferous forests of the western flanks of the Rocky Mountains and adjacent ranges.

Range.—In Western North America from north-western California northward to south-eastern Alaska, extending eastward to the western Rocky Mountains in B.C. and possibly southward to Montana; present also in Japan, Kamtchatka, and Eastern China.

Notes.—Now generally treated as *Pogonatum laterale* (Brid.) Brid.



Pogonatum contortum

Pogonatum macounii Kindb.

Gametophytes dark green, not glossy, of unbranched or slightly branched erect wiry shoots forming loose turfs 3–20 cm. tall, sometimes taller. Stems red-brown, rhizoids scattered on the stem and whitish, but most abundant near stem base. Leaves lanceolate from a broadly sheathing (often colourless) base, tapering abruptly into a narrow, almost subulate point, 1–2 cm. long, base 1–2 mm. wide; margins sharply toothed and plane, leaf apex arching out at an angle from stem above sheathing base, somewhat imbricate and slightly contorted when dry; lamellæ apparent at 12×, covering entire point, but essentially absent from the sheathing base, costa forming ridge on the back of the leaf, often brownish, especially near leaf base. Leaves confined to younger portion of shoot, deciduous on lower part. Perichætial leaves similar to others; perigonial leaves short and stout, formed essentially of sheathing base, forming bud-like perigonia. Perigonial plants often in different tufts than others. Calyptra essentially covering the mature capsule, light brown, conspicuously hairy and deciduous before the operculum is shed.

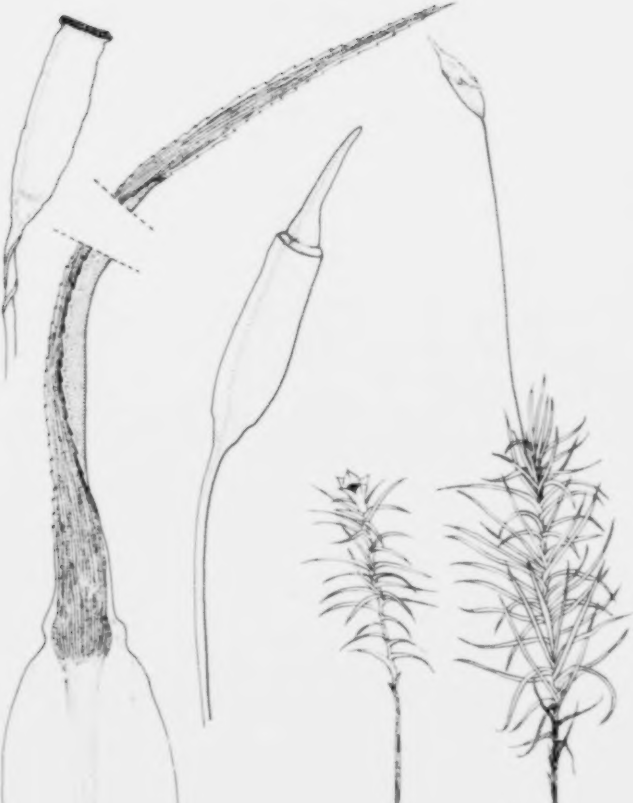
Sporophytes at apex of main shoot, occasionally appearing lateral due to growth of the stem, which branches at same level as the seta base. Seta light brown, darker toward base, wiry, smooth, glossy, not twisted when dry, 3–4 cm. long. Capsule cylindric, somewhat curved, 5–7 mm. long (including operculum), green when mature, darkening to dark brown when old and dehisced, 1.5–2 mm. in diameter, not glossy, the mouth somewhat flaring; operculum with distinct snout to 2 mm. long. Peristome teeth whitish, not glossy, incurved over whitish epiphragm. Sporophytes maturing in late winter to early spring.

Habitat.—Variable, on rotten logs, banks, overturned tree roots, cliff shelves and forest floor, especially in humid areas that are somewhat shaded and generally in coniferous forest.

Similar Species.—Most likely to be confused with *Polytrichum*, from which it is readily distinguished by the capsule, which in *Polytrichum* is angled but in *Pogonatum* is rounded in cross-section. Sterile plants are difficult to separate from *Polytrichum* by hand-lens characters. *Pogonatum alpinum*, a species of mountain areas, will key out to this species and is very like it, except in size.

Distribution in B.C.—Probably confined to the Coastal coniferous forests, although it may be found in the humid coniferous forests of the Revelstoke area and both northward and southward.

Range.—Coastal Alaska southward to north-western California. *Pogonatum alpinum*, a closely related species, is circumboreal in the Northern Hemisphere and present also in subantarctic areas.



Pogonatum macounii

Pohlia camptotrachela (Ren. & Card.) Broth.

Gametophytes forming loose to dense turfs of erect unbranched yellow-green to light green plants 0.5–2 cm. high. Leaves distant on stems, the upper leaves bearing masses of deciduous gemmæ in axils. Stem red-brown below and grading to green toward apex; rhizoids confined to base of stem. Leaves ovate to ovate-lanceolate, obscurely toothed (at 12×) toward apex, 0.5–1 mm. long, 0.3–0.5 mm. broad at base, not glossy except whitish conspicuous costa; leaves spreading when humid, somewhat imbricate and slightly contorted when dry. Perichætial leaves not conspicuously different from others; plants usually lacking sporophytes. Calyptra cucullate, smooth, deciduous before operculum is shed.

Sporophytes very uncommon, the plant freely reproducing by axillary gemmæ. Capsule ovate to pear-shaped, nodding, not glossy, light brown, 1–1.5 mm. long (including convex operculum), 1 mm. in diameter (or less), terminal on a main shoot, but never borne on gemma-bearing shoot. Seta yellowish to pale reddish-brown, slightly glossy, smooth, often somewhat contorted, 0.5–1 cm. long. Peristome double, the outer teeth yellowish, the inner colourless. Sporophytes produced in spring.

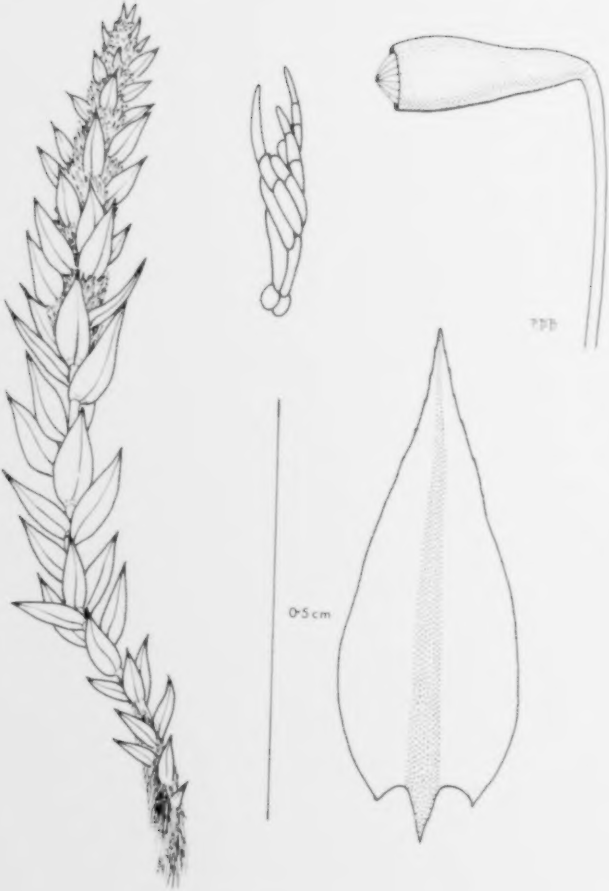
Habitat.—Disturbed soil, common in gardens in cities and towns, especially near the coast, also on earth banks by streams and roadsides.

Similar Species.—Several species of *Pohlia* produce axillary gemmæ and are not readily separated from this one on hand-lens characters. Possibly it could be confused with sterile specimens of *Plagiothecium elegans*, but this moss tends to be glossy, creeping, somewhat branched, and with the leaves somewhat complanate. This moss also often produces masses of gemmæ on the stem.

Distribution in B.C.—Possibly widespread, but little collected since it is generally without sporophytes; certainly common in the Coastal region, possibly also in the mountainous areas eastward and northward, probably absent from the arid portion of the Province.

Range.—Probably circumboreal in the Northern Hemisphere.

Notes.—Now generally treated as *Pohlia annotina* (Hedw.) Lindb. Our material is probably all the variety *loeskei* Crum, Steere & Anderson.



Pohlia camptotrachela

***Pohlia cruda* (Hedw.) Lindb.**

Gametophytes light green to bluish-green, with slight metallic sheen (at 12×), of loose masses of erect unbranched shoots 1–3 cm. long. Stem red-brown. Leaves distant, imbricate to erect-spreading, ovate, averaging 1.5 mm. long and 0.5 mm. wide toward leaf base, but the lowermost leaves very tiny (less than 0.5 mm. long), often pale reddish-brown with a red costa. Leaf margins plane, with distant obscure teeth (not apparent at 12×) near the apex. Costa obvious in green leaves, usually without lustre, sometimes reddish toward base. Ageing plants turning pale reddish-brown with the costa dark red-brown, these common among the younger plants. Perichætial leaves lanceolate, spreading, 2–3 mm. long and 0.5 mm. wide. Calyptra conic, smooth, deciduous before operculum is shed.

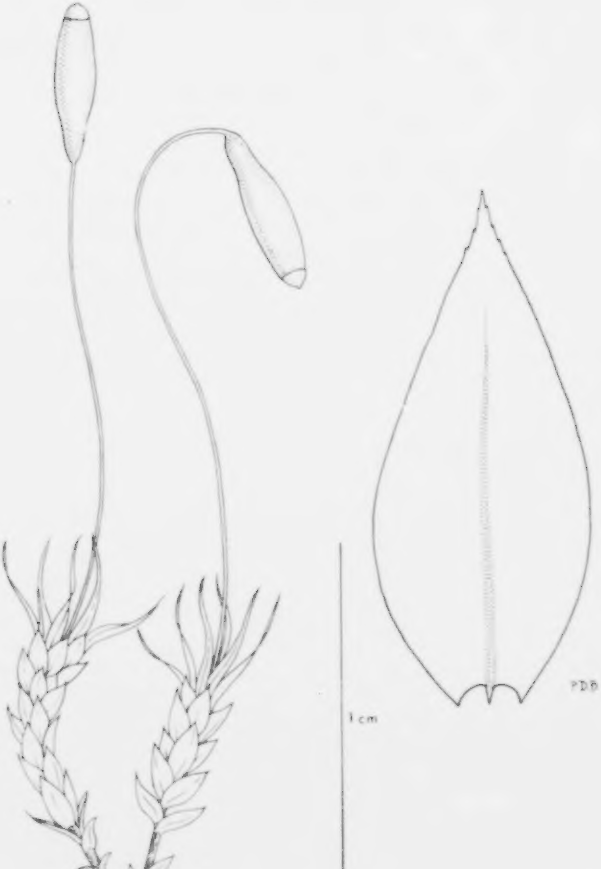
Sporophytes at apex of main shoot. Seta red-brown, smooth, not twisted when dry, 1.5–2 cm. long. Capsule pale brown to green when mature, cylindric, tapering to seta, not glossy, 2–3 mm. long, widest toward mouth (to 1 mm.). Operculum convex, less than 0.5 mm. long. Peristome double, outer teeth pale yellow and inner colourless. Sporophytes maturing early summer.

Habitat.—Usually shaded sites in humid conferous forests to subalpine and alpine areas; frequent in cliff crevices, among boulders on slopes and on stream banks.

Similar Species.—The metallic bluish-green plants, the suberect cylindric capsules, and the habitat are sufficient to separate this from most species of *Bryum, Pohlia,* and *Mnium,* but if sterile the plants could be confused with many species of these genera.

Distribution in B.C.—Probably throughout wherever there are humid coniferous forests and subalpine regions; possibly absent from the arid Interior.

Range.—Cosmopolitan — throughout North and Central America in proper habitats, also throughout Eurasia, also in Southern South America, Australia and New Zealand.



Pohlia cruda

Pohlia nutans (Hedw.) Lindb.

Gametophytes dark green to light green, with slight suggestions of glossiness, forming short loose turfs of erect unbranched plants, 7–12 mm. high. Leaves close, spreading when humid, imbricate when dry; stem red-brown; rhizoids confined to stem base. Leaves linear-lanceolate to ovate-lanceolate, mostly 2 mm. long and 0.5 mm. wide, tapering gradually to apex; margins plane, with distant teeth (visible at 12×) toward apex; costa forming conspicuous ridge on back of leaf, usually same colour as leaf. Perichætial leaves somewhat longer than others, spreading. Calyptra conic, smooth, deciduous before operculum is shed.

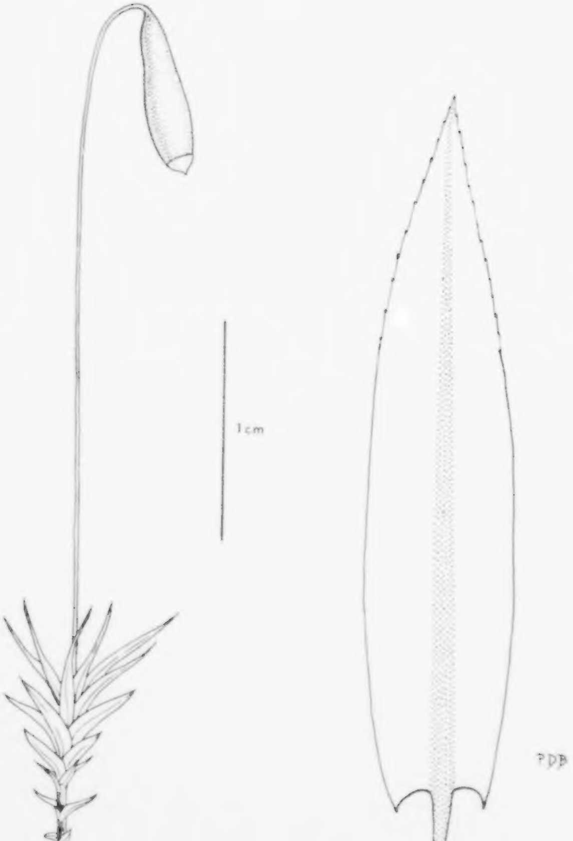
Sphorophytes at apex of main shoot. Seta light red-brown, glossy, little twisted when dry, 2–4 cm. long (occasionally longer). Capsule pale red-brown, not glossy, nodding, cylindric to pear-shaped, 3 mm. long, 1 mm. in diameter, conspicuously contracted below mouth when dry; operculum convex to short conic, less than 0.5 mm. long. Peristome double, the outer teeth light yellow and the inner colourless. Sporophytes maturing in early summer.

Habitat.—Commonly on rotten wood in coniferous forests, but also in bogs, on humus, on disturbed banks, and on soil where fires have been.

Similar Species.—Can be confused with many species of *Bryum*, from which it is not readily distinguished by hand-lens characters. The same is true for many species of *Pohlia*.

Distribution in B.C.—Probably throughout, extremely common in the northern and eastern parts of the Province but also widespread in other areas.

Range.—Cosmopolitan—throughout the Northern Hemisphere and at high elevations in both tropical latitudes and in the cooler portions of the Southern Hemisphere.



Pohlia nutans

Pohlia wahlenbergii (Web. & Mohr.) Andrews

Gametophytes yellow-green with conspicuous red-brown stems, not glossy, of essentially unbranched erect shoots 0.5–1.5 cm. high, forming loose to tight turfs. Rhizoids largely confined to lower portion of stem. Leaves ovate to ovate-lanceolate, 1–2 mm. long, 0.5–1 mm. wide, tapering gradually to apex, distant on stem, spreading when dry, imbricate when moist. Costa red-brown, conspicuous, margins plane, with distant teeth toward apex (barely visible at 12×). Perichætial leaves longer than others. Perigonial plants usually scattered, each bearing a flower-like bud of perigonial leaves at the summit (*see* illustration). Calyptra conic, smooth, deciduous before the operculum is shed.

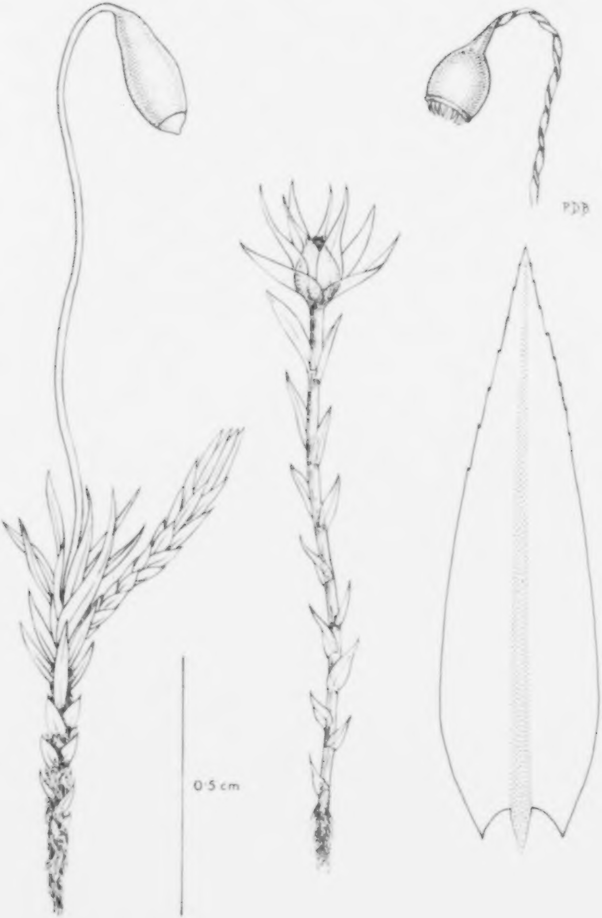
Sporophytes at apex of main shoot (but sometimes with lateral branches emerging below it). Seta red-brown to dark brown, 1–3 cm. long, strongly twisted when dry, somewhat glossy. Capsule nodding, not glossy, red-brown when mature, pear-shaped, 1–2 mm. long, 1 mm. in diameter, the neck shrinking almost to the dimensions of the seta when dry, leaving the remainder of the capsule nearly spherical. Operculum convex to short conic, less than 0.5 mm. long. Peristome double; outer teeth reddish-brown, the inner colourless. Sporophytes maturing in early spring to summer.

Habitat.—Generally in moist or seepy habitats on ditch banks and on earth cliffs, often abundant in subalpine and alpine localities, forming extensive mats by snow-melt or glacial streamlets in meadows where the plants are larger and more luxuriant than at low elevations.

Similar Species.—When sterile likely to be confused with *Philonotis,* which grows in the same habitat and has the same appearance. The sporophytes are entirely different (subspherical, grooved, and suberect in *Philonotis;* pear-shaped, smooth, and nodding in *Pohlia*), and the stems of *Philonotis* generally are richly clothed with rhizoids, while in *Pohlia* the rhizoids are scattered, largely near the stem base. A number of other species of *Pohlia* have a capsule similar to that of *P. wahlenbergii* and cannot be easily separated on hand-lens characters.

Distribution in B.C.—Probably throughout.

Range.—Cosmopolitan through the Northern Hemisphere, particularly in temperate and arctic climates, also scattered in the Southern Hemisphere in similar climates.



Pohlia wahlenbergii

Polytrichum commune Hedw.

Gametophytes dark green, not glossy, except at sheathing leaf bases, forming loose to tight tall turfs 6–20 cm. tall (sometimes taller), of wiry unbranched shoots. Stems red-brown, but concealed by the whitish sheathing leaf bases. Leaves usually strongly spreading and recurved (when moist) from the sheathing base, frequently somewhat contorted and remaining spreading when dry (but in some drier habitats imbricate both wet and dry). Rhizoids confined largely to the base of the stem and not conspicuous or abundant. Leaves lanceolate from the sheathing base, 0.6–1.5 cm. long, the sheathing base 1–2 mm. broad and 2–3 mm. long, and the lanceolate lamella-bearing apex making up the remainder of the leaf. Margin plane, conspicuously toothed at 12×, lamellæ covering the entire spreading portion of the leaf, absent from the sheathing base. Costa barely apparent as a glossy ridge on the back of the leaf. Perigonial plants in separate colonies or mixed with sporophyte-bearing plants. Perigonial leaves forming apical cups, composed of bluntish tightly packed leaves (*see* figure opposite), brownish. Perichætial leaves colourless to brownish, lanceolate, lacking lamellæ, sheathing the base of the seta, not toothed. Calyptra light brown, hairy, investing the entire sporangium, deciduous before the operculum is shed.

Sporophytes terminal on main shoot, usually solitary on each shoot, when young the capsule erect to suberect, becoming inclined as it matures. Seta wiry, 6–10 cm. long, glossy, not twisted when dry. Capsule rectangular, with four conspicuous angles (sometimes supplementary angles when dry), 3–4 mm. long, 2 mm. in diameter, not glossy, often with powdery blue-grey bloom when young, light reddish-brown with age, contracted below mouth when mature. Operculum abruptly snouted. Peristome teeth whitish, curving over whitish epiphragm. Sporophytes maturing in early summer.

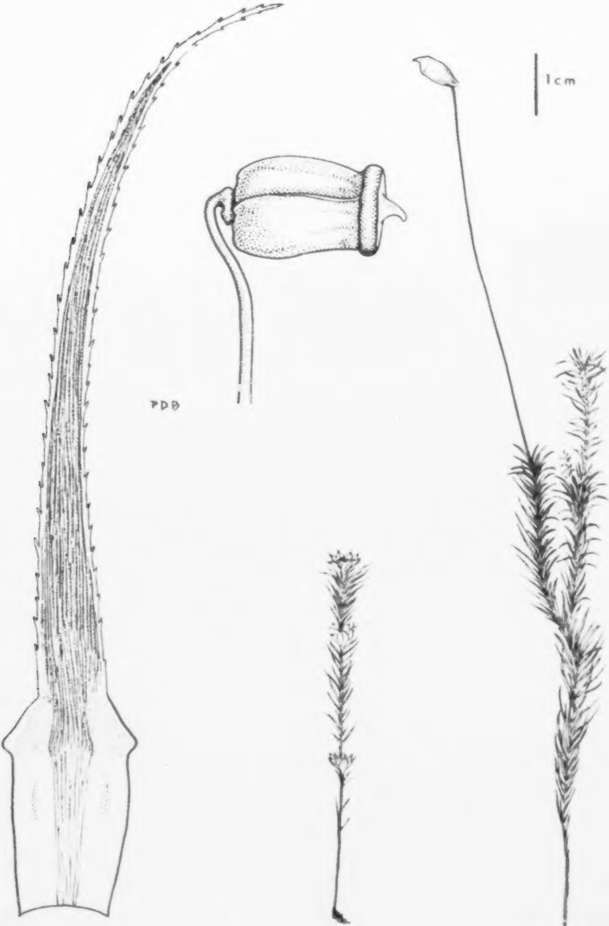
Habitat.—Commonest in moist localities (when on outcrops usually in dampish pockets), common along margins of lakes, ponds, and streams, usually in open areas.

Similar Species.—If bearing sporophytes it can be readily distinguished from all other genera except *Polytrichadelphus*. *Polytrichadelphus* capsules, however, tend to taper conspicuously toward the mouth, a feature never present in *Polytrichum commune*. From sterile *Pogonatum macounii* it cannot be readily distinguished on hand-lens features (*see* discussion under that species). From other species of *Polytrichum* in the Province it can be readily separated. Only *P. formosum* shows the toothed margins. From this species it is not readily separated on hand-lens characters.

Distribution in B.C.—Probably throughout except in the arid Interior, commonest in the mountains and in the boreal forest regions.

Range.—Cosmopolitan throughout the Northern Hemisphere and also scattered in the Southern Hemisphere in cooler climates.

Notes.—Commonly called " hair cap moss," based on the hairy calyptra.



Polytrichum commune

Polytrichum juniperinum Hedw.

Gametophytes dark green to a pale bluish-green to red-brown, not glossy except at leaf bases, forming loose to tight tall turfs 2–10 cm. tall, of wiry unbranched shoots. Stems red-brown, obscured by leaf bases except at the base of the shoot. Leaves spreading (never recurved) when humid, strongly imbricate when dry, lanceolate from the sheathing base 7–10 mm. long (including sheathing base), 1–1.5 mm. broad at sheathing base and gradually tapering to the lamella-bearing lamina. Margins entire, incurved over the lamellæ (and transparent), apex usually reddish-brown. Rhizoids confined to lower part of stem (except in bog plants). Costa apparent as a whitish to brownish keel on the back of the leaf, concealed by lamellæ on the upper surface. Perichætial leaves lanceolate, usually concealed by other leaves, but formed largely of the sheathing base (and sheathing the seta base), often with an awn. Perigonial plants usually in separate tufts, but sometimes mixed with sporophyte-bearing plants. Perigonial bracts often forming bud-like mass at apex of shoot, the bracts formed entirely of broadened leaf-bases with no lamina, often brownish to red-brown. Calyptra light brown, sheathing entire capsule, hairy, deciduous before the operculum is shed.

Sporophytes solitary and terminal on main shoot; when young the capsule erect, inclined with age. Seta wiry, 2–6 cm. long, red-brown, glossy, not twisted when dry. Capsule rectangular to squarish, with four conspicuous angles, light red-brown, 2–3 mm. long, 1–2 mm. in diameter, not glossy, sometimes with powdery bloom. Operculum with conspicuous snout, 1–2 mm. long, only slightly contracted below mouth when dry. Peristome teeth whitish, curving over yellow-brownish epiphragm. Sporophytes maturing in early summer.

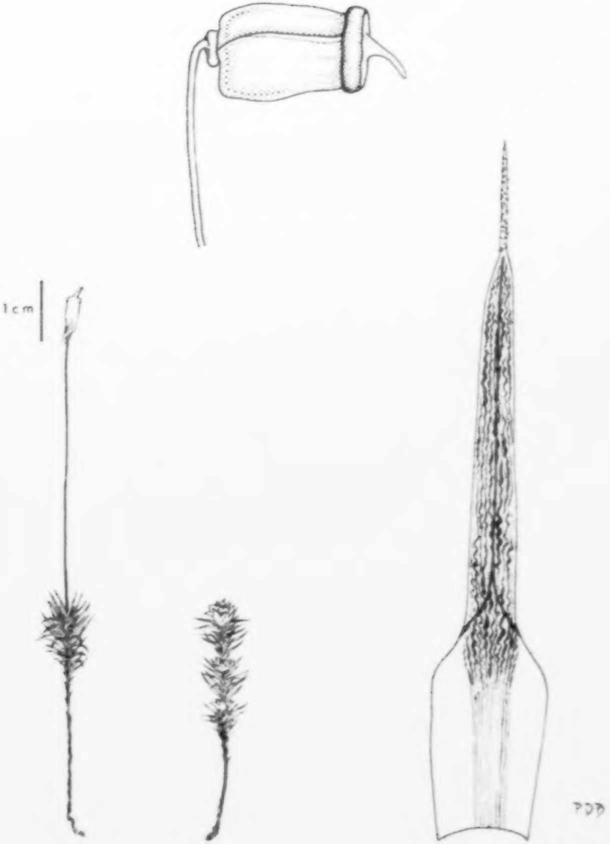
Habitat.—On sterile earth, or humus, usually acid, generally in dryish or well-drained sites (sometimes in bogs), often on thin earth over outcrops, generally in sunny sites, where it reaches its richest development, but also in coniferous forests at all elevations, extending to subalpine and alpine elevations.

Similar Species.—The absence of teeth on the leaves is enough to seperate this from most other genera that superficially resemble it. The presence of the red tip of the leaf is also helpful. (*P. piliferum* has a conspicuous toothed white hair point). From *Polytrichum sexangulare* it can be distinguished both by the sporangium (which in *P. sexangulare* has more than four angles) and by the leaves (which in *P. sexangulare* have a bluntish apex and generally lack a red tip). In *Oligotrichum* the capsules have a hairless calyptra, and in *O. hercynicum* and *O. aligerum*, the species might be confused with it, the leaves tend to curve inward when dry, a feature never in *P. juniperinum*; the capsules of these species are round in cross-section.

Distribution in B.C.—Common throughout the Province in all climates and elevations.

Range.—Probably the most cosmopolitan moss in the world—throughout the Northern Hemisphere, also relatively widespread in the Southern Hemisphere, but largely confined to arctic or temperate climates.

Notes.—Commonly called " hair cap moss," based on the hairy calyptra.



Polytrichum juniperinum

Polytrichum piliferum Hedw.

Gametophytes dark green to bluish-green to red-brown, somewhat glossy, of unbranched wiry erect shoots forming a dense turf 0.5–3 cm. high. Stems red-brown but concealed by imbricate to erect spreading (when moist) leaves; rhizoids confined to stem base. Leaves lanceolate from sheathing base, the margins incurved (and transparent) enclosing the lamellæ, apex forming a white toothed hair point. Leaves, including base and hair point, 5–8 mm. long, 1 mm. wide at base, the white hair point 2–3 mm. long. Costa forming inconspicuous ridge up back of the leaf, apparent in the sheathing base. Perichætial leaves lanceolate, whitish, formed of extended sheathing base, usually with hair point, lacking lamellæ, sheathing base of seta. Perigonial plants in separate colonies or mixed with sporophyte-bearing plants. Perigonial leaves forming tight red-brown buds at apex of shoots (*see* figure opposite). Calyptra whitish to tawny brown, hairy, completely sheathing capsule, deciduous before the operculum is shed.

Sporophyte solitary at apex of main shoot. Seta wiry, red-brown, glossy, not twisted when dry, 2–3 cm. long. Capsule pale to deep red-brown, often with powdery bloom when young, never glossy, squarish to rectangular 1.5–2 mm. long, 1 mm. in diameter, with four conspicuous angles, sometimes with smaller supplementary angles, erect when young, somewhat inclined when mature, somewhat contracted below mouth when dry. Operculum conic to snouted, 1 mm. long or less. Peristome teeth whitish, incurved over the whitish epiphragm. Sporophytes maturing in early summer.

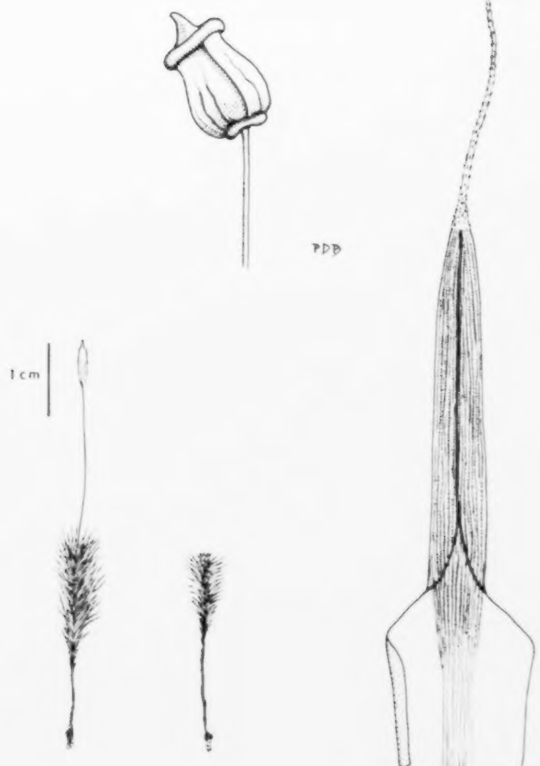
Habitat.—Sterile earth or humus, acid and in dryish sites, often on thin earth over outcrops, generally in extremely sunny sites; frequent at all elevations, often forming extensive colonies.

Similar Species.—Note comments under *Polytrichum juniperinum*. *P. piliferum* is the only *Polytrichum* that possesses conspicuous white toothed hair points, thus is usually easily identified on this character alone.

Distribution in B.C.—Probably throughout in relatively sterile habitats, very tolerant of drying out.

Range.—Cosmopolitan—frequent throughout the Northern Hemisphere in temperate, arctic, and relatively dry climates. Also in Southern Hemisphere in the subantarctic region and in Australia.

Notes.—Commonly called " hair cap moss," based on the hairy calyptra.



Polytrichum piliferum

Ptilium crista-castrensis (Hedw.) De Not.

Gametophytes pale green to yellowish to golden-yellow, regularly pinnate, suberect to reclining, shoots forming soft mats of partially interwoven shoots 3–9 cm. long, sometimes longer, with the branches in a single plane 4–10 mm. long, shorter toward apex. Stems yellowish to pale green. Leaves falcate-secund and pleated, costa not apparent or absent. Stem leaves ovate, tapering gradually to a narrow acute apex, margins somewhat recurved or plane, entire. Stem leaves 1–2 mm. long, 1 mm. broad at base; branch leaves 0.5–1 mm. long, 0.5 mm. broad at base, otherwise similar to stem leaves. Perichætial leaves lanceolate, not falcate or secund, sheathing base of seta, always pale green to whitish. Calyptra cucullate, smooth, shed very early.

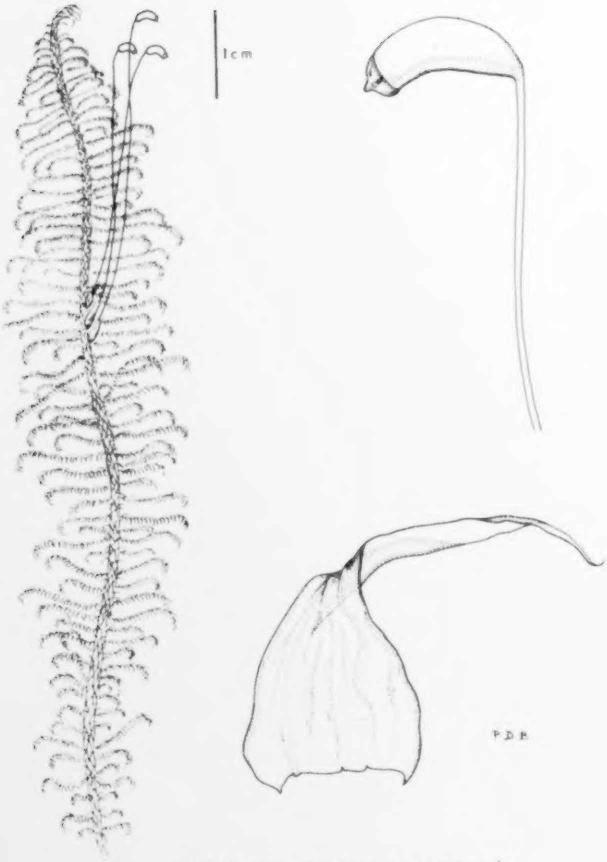
Sporophytes lateral, well behind the apex of the shoot, usually more than one on each shoot, but rarely produced in some colonies. Seta red-brown, 3–5 cm. long, slightly glossy, twisted when dry. Capsule red-brown, not glossy, cylindric, tapering into seta, strongly curved when mature, 3 mm. long, 0.7 mm. in diameter, contracted below mouth when mature, operculum conic, 1 mm. long. Peristome double, outer teeth dark red-brown, inner colourless. Sporophytes maturing in summer.

Habitat.—Commonly in coniferous forest, occasionally on bog margins, sometimes on rotten wood but generally on forest floor.

Similar Species.—Might be confused with some species of *Hypnum,* but only *Hypnum subimponens* is likely to give some trouble, but its leaves are not pleated, and the branches tend to curl up when dry, never the case in *Ptilium.* From *Drepanocladus uncinatus,* a species of similar habitats, it differs in that the plants are never so regularly pinnate in *Drepanocladus,* and this genus has a costa.

Distribution in B.C.—Scattered throughout, but very rare in Coastal forests and extremely common, forming extensive carpets, in the boreal coniferous forest of the northern and eastern portions of the Province.

Range.—Circumpolar in the Northern Hemisphere both in North America and Eurasia. In Eastern America extending down the Appalachian Mountains to Tennessee and North Carolina; in Western America extending down the Rocky Mountains to Montana and in the Coast Mountains south to Washington.



Ptilium crista-castrensis

Rhacomitrium aciculare (Hedw.) Brid.

Gametophytes dark green to yellow-green, occasionally nearly black, or reddish-brown, forming tufts of irregularly branched shoots attached to the substrate by the base of the shoot, 1.5–6 cm. long with branches varying from 1–3 cm. long. Stems red-brown, obscured by the leaves. Leaves imbricate when dry, erect spreading when moist, broadly lanceolate, 2–2.5 mm. long, 0.7–1 mm. wide, margins slightly recurved, with widely spaced blunt teeth (often not apparent at 12×) toward obtuse apex. Costa forming conspicuous ridge on the back of the leaf, somewhat reddish. Perichætial leaves like others. Calyptra smooth, conic, covering operculum, fringed at base, deciduous before operculum is shed.

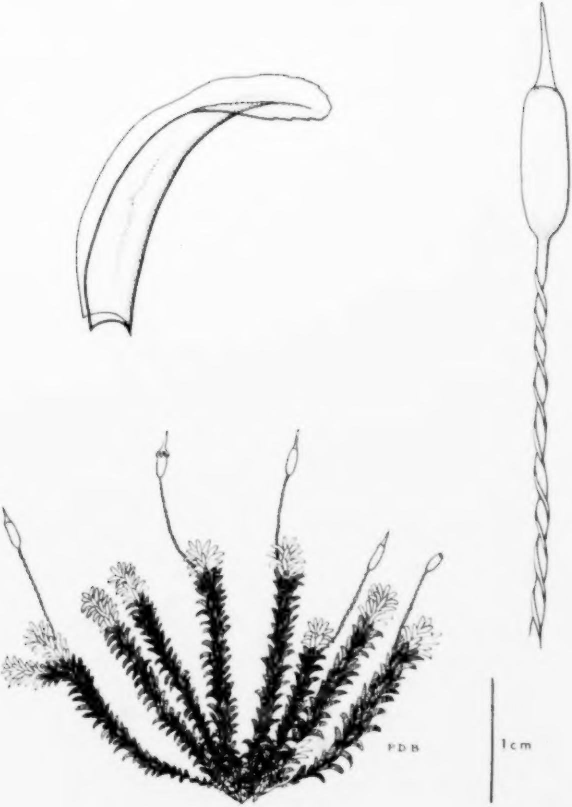
Sporophytes at apex of main shoot, soon appearing lateral by growth of the same shoot. Seta dark brown to nearly black, 0.2–1.5 cm. long, corkscrew twisted when dry, slightly glossy. Capsule light to dark brown, erect, elliptic to cylindric, smooth, glossy, 1.5–2 mm. long, 1 mm. in diameter. Operculum rostrate, 1–1.5 mm. long. Peristome single, of dark-brown narrow teeth. Sporophytes maturing in winter.

Habitat.—In wet sites, generally on rock perennially splashed; at all elevations, particularly near watercourses.

Similar Species.—Might be confused with *Scouleria* of the same habitats or with *Grimmia alpicola*, but both of these species possess capsules that are virtually immersed. In *Scouleria* the leaves are recurved when wet, a feature never present in the *Rhacomitrium*. Several species of *Rhacomitrium* can be confused with this one, but hand-lens characters are insufficient to distinguish them.

Distribution in B.C.—Probably throughout within coniferous forest regions, at all elevations, frequent at high elevations and along most watercourses.

Range.—Circumboreal in the Northern Hemisphere—in Western North America extending southward in the Rocky Mountains as far south as Arizona, and in Eastern North America southward to Alabama.



Rhacomitrium aciculare

Rhacomitrium canescens (Hedw.) Brid.

Gametophytes yellow-green to whitish, not glossy, of regularly branched suberect to creeping shoots, much interwoven to form thick carpets 2–5 cm. deep. Branches numerous, all from a single plane, 1–2 mm. long. Stems red-brown, obscured by leaves. Leaves imbricate with recurved white apices. Leaves ovate, tapering gradually to apex, 2 mm. long, 1 mm. broad at base, with recurved margins and white toothed apex. Costa forming a conspicuous ridge on the back of the leaf. Perichætial leaves like others. Calyptra conic, forming a tiny cap over the operculum with fringed margin, smooth.

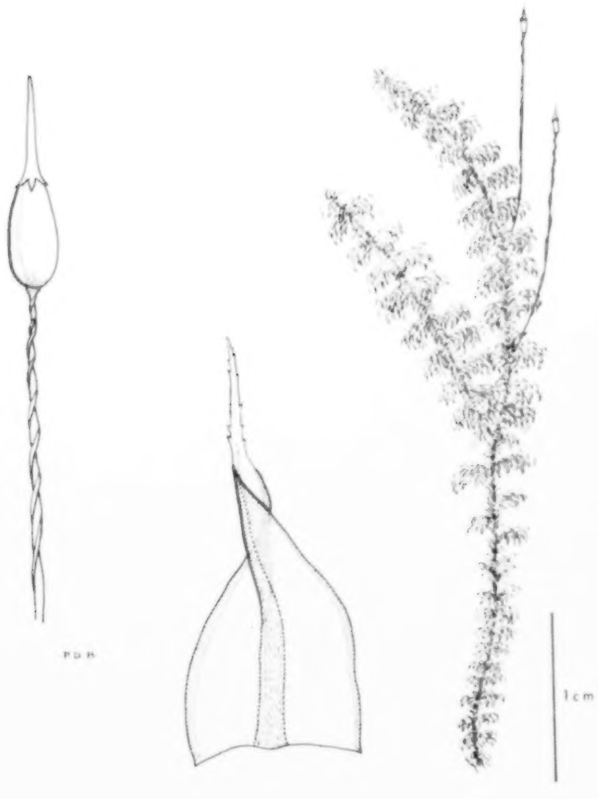
Sporophytes on short lateral branches arising far back from apex of main shoot. Seta red-brown, glossy, corkscrew twisted near apex when dry, 1–1.7 cm. long. Capsule dark red-brown, erect, cylindric, glossy, somewhat grooved when dry, 2 mm. long, 0.5 mm. in diameter. Operculum rostrate, 1 mm. long. Peristome of straight dark-brown teeth, 1 mm. long, erect when dry or wet. Sporophytes maturing in autumn.

Habitat.—On sterile acid soil or rocks in exposed habitats or dry coniferous forest, from sea-level to subalpine sites.

Similar Species.—Unlikely to be confused with any other species than *R. lanuginosum;* this latter species shows clearly tattered margins near the apex (even at 12×) and the lateral branches are very few. The sporophytes are elliptic, and the seta is much shorter than that of *R. canescens* (*see* description).

Distribution in B.C.—Probably throughout, extremely common in the boreal coniferous forest and also frequent on the coastlines.

Range.—Circumpolar in the Northern Hemisphere.



Rhacomitrium canescens

Rhacomitrium heterostichum (Hedw.) Brid.

Gametophytes dark green (to nearly black) to light green to yellow-green, often greyish white from the conspicuous hair points of the leaves, not glossy, of irregularly branched suberect to creeping plants forming tight tufts or loose mats, 2–7 cm. long, with branches 1–6 mm. long. Stems red-brown, obscured by leaves. Leaves imbricate to somewhat secund when dry, erect spreading when moist. Leaves lanceolate, 3–3.5 mm. long, 1 mm. wide at base, with conspicuous white hair point. Costa apparent as a ridge on the back of the leaf. Perichætial leaves like the others. Calyptra smooth, forming a small fringed cap over the operculum.

Sporophytes borne on short lateral branches arising well behind the growing point of the main shoot. Seta red-brown, corkscrew twisted when dry, slightly glossy, 2–6 mm. long. Capsule cylindric, erect, red-brown, 1.5–2.5 mm. long, 0.5–1 mm. in diameter. Operculum long conic to rostrate, 1.5 mm. long. Peristome teeth red-brown, erect when dry, 0.5 mm. long. Sporophytes maturing in spring to summer dependent on elevation.

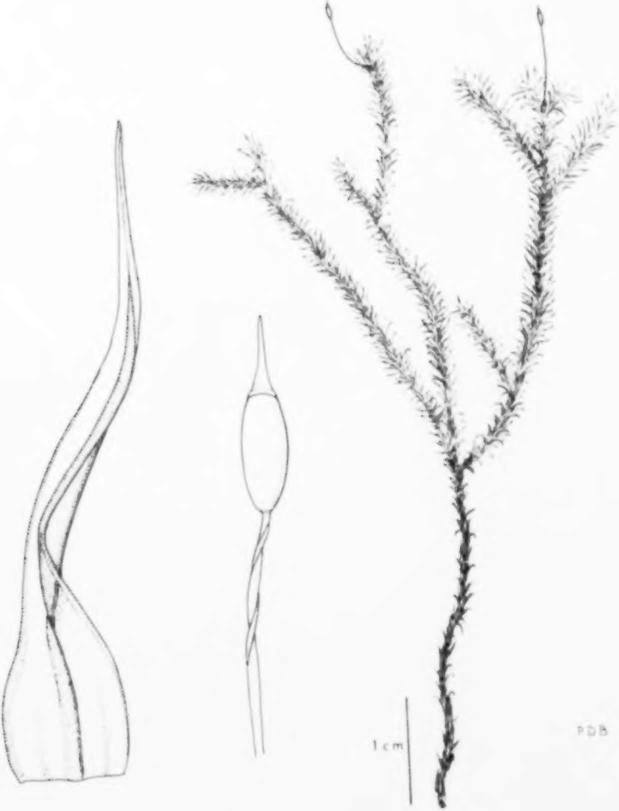
Habitat.—On acid rocks at all elevations, usually in exposed localities.

Similar Species.—The hair points distinguish it from most other species of *Rhacomitrium*. *R. canescens* has many regular short lateral branches, while *R. heterostichum* has few branches, and these are irregular on the stem. *R. lanuginosum* has the hair points appearing tattered-edged, even at 12× magnification. Since *R. heterostichum* is treated here as a highly variable species, it is relatively easily determined. Of other mosses with hair points on the leaves, *Grimmia* is most likely to be confused, but in these the capsule is either immersed among the leaves or the capsule is short elliptic, often with a sinuous seta (not corkscrew twisted); the peristome teeth of *Rhacomitrium* are slender and needle-like while those of *Grimmia* are broader and triangular and tend to flare outward when dry, while in *Rhacomitrium* they are erect.

Distribution in B.C.—Probably throughout at all elevations, very common in the Coastal region on cliffs and exposed outcrops, also frequent in the Interior.

Range.—Cosmopolitan, in the Northern Hemisphere.

Notes.—This species is treated in a very broad sense, including some species that are closely related.



Rhacomitrium heterostichum

Rhacomitrium lanuginosum (Hedw.) Brid.

Gametophytes brownish-green to yellow-green, frequently appearing nearly white from the hair points of the leaves, not glossy, forming loose turfs or mats of suberect interwoven shoots. Stems 2–6 cm. long, red-brown, with numerous to few short lateral branches (2–4 mm. long) emerging from one plane on either side of the stem. Leaves imbricate to divergent when wet or dry, sometimes secund. Leaves lanceolate 3–5 mm. long, tapering gradually to conspicuous white hair point, the margins of which appear tattered at 12×, the lower margins somewhat revolute. Costa conspicuous as a ridge on the back of the leaf. Perichætial leaves like the others. Calyptra smooth, forming a small fringed cap over the operculum.

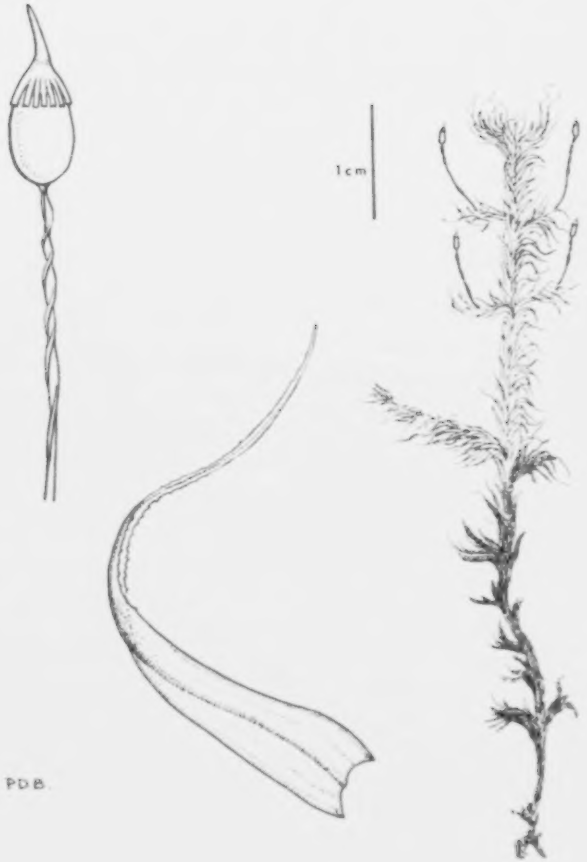
Sporophytes borne on short lateral branches. Seta red-brown, corkscrew twisted when dry, 4–5 mm. long, slightly glossy. Capsule erect, elliptic to cylindric, glossy, 1.2 mm. long, 0.5 mm. in diameter. Operculum 0.8 mm. long, rostrate to long conic. Peristome teeth red-brown, needle-like, erect when dry. Sporophytes maturing in spring.

Habitat.—On boulders of talus slopes, in alpine tundra, in bogs and fens, always in sunny sites.

Similar Species.—See notes under *Rhacomitrium canescens* and *R. heterostichum.*

Distribution in B.C.—Widespread, probably uncommon in the arid Interior, but otherwise present at all elevations.

Range.—Circumpolar in the Northern Hemisphere, also scattered in the Southern Hemisphere, there largely in mountains and at polar latitudes.



Rhacomitrium lanuginosum

Rhytidiadelphus loreus (Hedw.) Warnst.

Gametophytes light green to yellowish-green, forming dense interwoven glossy mats of creeping plants 5–20 cm. long, branching irregularly to regularly pinnate, the branches 0.2–4 cm. long, the terminal leaves sometimes secund, but in some the branches tapering to apex. Stems red-brown. Leaves divergent to somewhat squarrose, wet or dry. Stem leaves broadly triangular, 4 mm. long, 1.5 mm. broad at base, tapering rapidly to narrowly acute apex, strongly pleated toward base, the apex usually recurved; margins entire, the upper portion of the leaf sometimes channelled. Branch leaves ovate to ovate-lanceolate, 2–3 mm. long, 0.5–1 mm. broad at base, pleated at base. Perichætial leaves not pleated, sheathing base of seta, but with divergent apices, lanceolate. Operculum cucullate, smooth, covering upper portion of capsule, early deciduous.

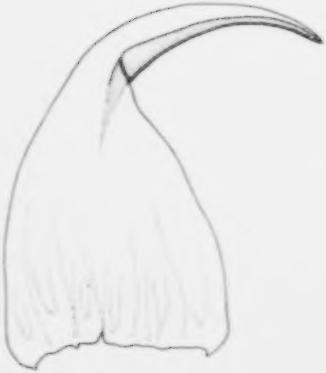
Sporophytes usually several per shoot, on short perichætial branches arising laterally far back from the apex of the main shoot, and perpedicular to the main shoot. Seta red-brown, twisted when dry, glossy, 3–4 cm. long. Capsule red-brown, ovoid to nearly spherical, inclined, 1.2 mm. long, 0.5 mm. in diameter, tapering to seta, barely glossy. Operculum conic, 0.7 mm. long. Peristome double, outer teeth red-brown. Sporophytes maturing in spring.

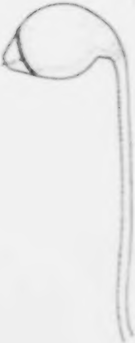
Habitat.—Forming dense carpets on coniferous forest floor, over humus and rotten logs, sometimes on cliff shelves and boulders. Usually in somewhat shaded sites.

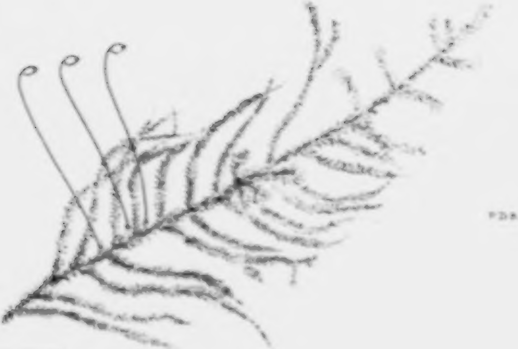
Similar Species.—Most likely to be confused with *Rhytidiadelphus squarrosus*, but the main shoots of this species tend to be perpendicular rather than creeping (the situation in *R. loreus*), and the leaves are markedly squarrose and never strongly pleated in *R. squarrosus*. *Eurhynchium oreganum* might be confused with the *Rhytidiadelphus*, but the *Eurhynchium* has markedly costate leaves that are not strongly pleated and the branching is very regularly pinnate in that species.

Distribution in B.C.—Very common in the Coastal coniferous forests where it often forms extensive thick soft carpets, at least as far east as the Cascade Mountains; present also in the coniferous forests of the Columbia Mountain range.

Range.—Of interrupted circumboreal distribution; scattered in Europe, in Iceland and the Faroe Islands, and in Continental Europe. In North America confined to Nova Scotia northward to Newfoundland, also in Ontario, and in Western North America from Alaska southward to California, extending eastward to Idaho at least.







Rhytidiadelphus loreus

Rhytidiadelphus squarrosus (Hedw.) Warnst.

Gametophytes light green to yellow-green, glossy, of irregularly branched suberect shoots (in open sites) or of regularly branched, occasionally pinnate shoots (in humid shaded sites) and the plants creeping, 3–7 cm. long with branches 0.3–1.5 cm. long, generally tapered to the apex except the main shoots. Stems red-brown, the leaves with somewhat sheathing base and strongly squarrose channelled apex (on the main stem), the shorter side branches with the leaves barely squarrose. Stem leaves ovate to broadly triangular, tapering to a long acute apex, lacking pleats, costa double (and apparent at 12×); stem leaves 4 mm. long, 2 mm. wide at base, margins entire. Branch leaves ovate lanceolate to lanceolate. Perichætial leaves narrowly lanceolate, whitish, sheathing base of seta. Calyptra cucullate, smooth, early deciduous.

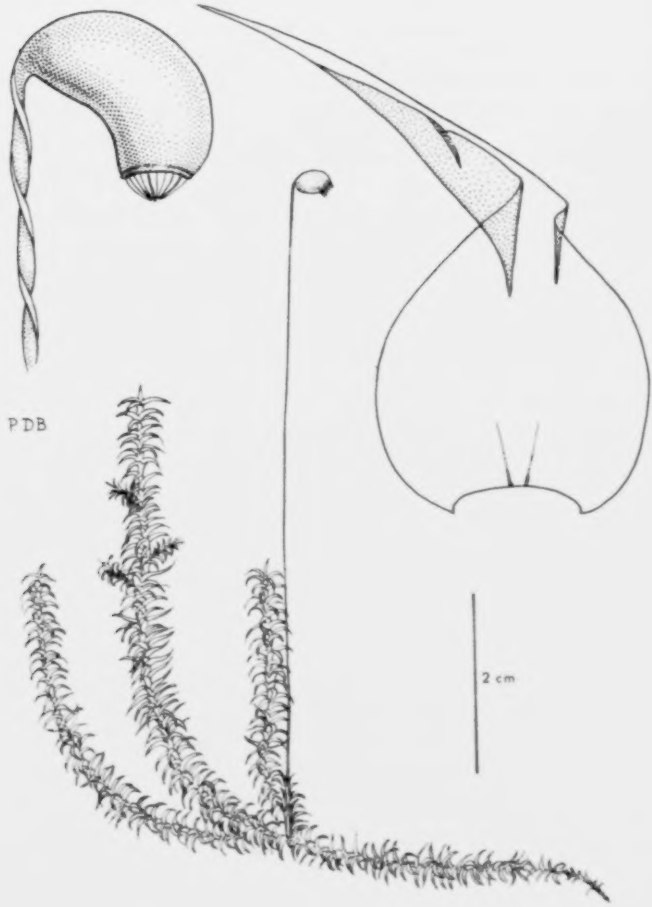
Sporophytes infrequently produced except in sea-coast populations, on short perichætial branch arising far back from the apex of the main shoot, and generally perpendicular to it. Seta red-brown, glossy, somewhat corkscrew twisted when dry, 2–2.5 cm. long. Capsule ovoid, somewhat curved, 2 mm. long, 1 mm. in diameter, somewhat glossy. Operculum conic, 0.5 mm. long or less. Peristome double, outer teeth reddish-brown. Sporophytes maturing in spring.

Habitat.—Very frequent in lawns, where it can become an obnoxious weed, also frequent along streams and rivers, lakes, and the seashore above tidal influence, there often forming extensive mats.

Similar Species.—See notes under *Rhytidiadelphus loreus.*

Distribution in B.C.—Probably throughout wherever the climate is sufficiently humid, therefore absent or rare in the arid Interior, otherwise widespread; especially frequent along the coast both in city lawns and in the natural vegetation.

Range.—Widespread in the boreal portion of the Northern Hemisphere.



Rhytidiadelphus squarrosus

Rhytidiadelphus triquetrus (Hedw.) Warnst.

Gametophytes forming thick pale green to yellow-green carpets of creeping irregularly to regularly branched shoots 5–15 cm. long, the branches 0.5–3 cm. long, frequently tapered to apex, barely glossy. The apices of the main shoots blunt with a tuft of divergent leaves. Stems red-brown. Leaves broadly triangular, shallowly pleated wet or dry, often with small undulations toward apex, costa double and conspicuous or obscure at 12×; leaves 6 mm. long, 3 mm. wide at base, the base sometimes somewhat sheathing. Perichætial leaves lanceolate, sheathing base of seta. Calyptra conic, smooth, early deciduous.

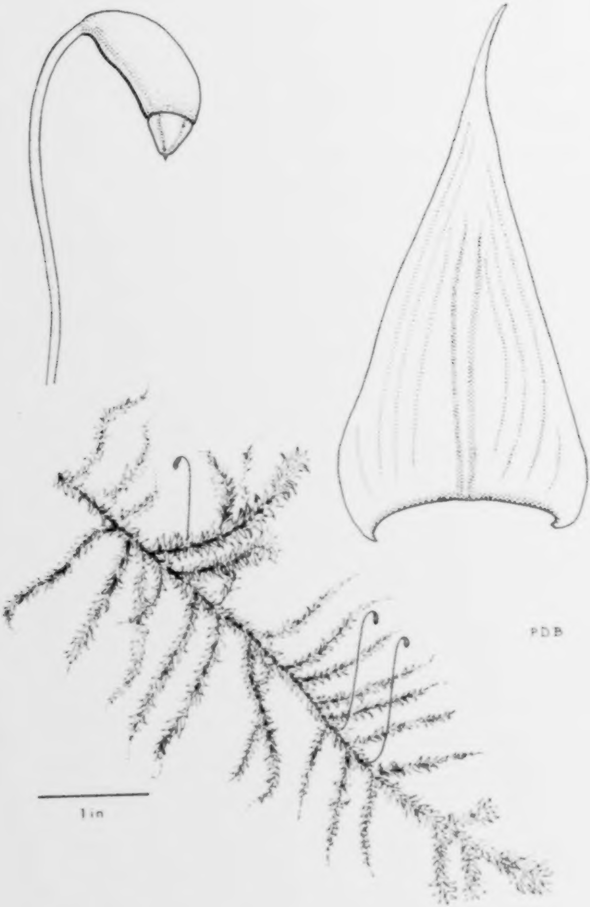
Sporophytes on short lateral perichætial branches arising far back from the apex of the main shoot and essentially perpendicular to it. Seta glossy, somewhat corkscrew twisted when dry, 2–3 cm. long. Capsule inclined, cylindric, curved, not glossy, sometimes irregularly grooved when dry, 3 mm. long, 1 mm. in diameter. Operculum conic, 0.5 mm. long. Peristome double, the outer teeth red-brown; sporophytes maturing in autumn.

Habitat.—Frequent in both shaded and somewhat sunny sites in both deciduous and coniferous forests and in dry to humid localities—on logs, boulders, among grasses, and on the forest floor.

Similar Species.—Might be confused with *Rhytidiopsis robusta*, a species generally of mountain forests, but the *Rhytidiopsis* has leaves that possess few deep regular parallel pleats rather than numerous shallow ones; the leaves tend to be secund and the apex tends to be obtuse. The stems of *Rhytidiadelphus* are red-brown, while those of *Rhytidiopsis* are yellowish to green.

Distribution in B.C.—Found throughout the Province.

Range.—Widespread in the Northern Hemisphere throughout all but the most arid parts of both North America and Eurasia.



Rhytidiadelphus triquetrus

Rhytidiopsis robusta **(Hook.) Broth.**

Gametophytes of irregularly few-branched creeping stems, golden to yellow-green, 3–12 cm. long, with branches 0.5–2 cm. long. Stems green to yellowish. Leaves ovate, tapering gradually to acute or obtuse apex, often with teeth toward apex, 5 mm. long, 2–3 mm. wide at base with deep irregular pleats and wrinkles. Costa double, apparent at 12×, one-quarter to one-third length of leaf. Perichætial leaves lanceolate, clasping base of seta. Calyptra conic, smooth, early deciduous.

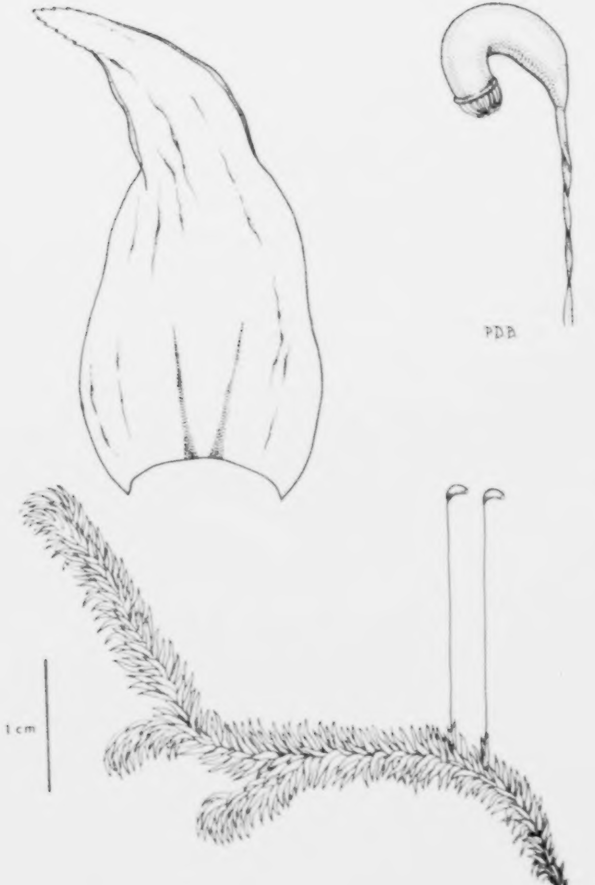
Sporophytes on short lateral perichætial branches arising far back from apex of main shoot and perpedicular to it. Seta light to dark red-brown, glossy, somewhate corkscrew twisted when dry, 2–3 cm. long. Capsule barely glossy, cylindric, strongly curved and inclined, 3 mm. long, 1 mm. in diameter. Operculum conic, 0.5 mm. long. Peristome double, teeth pale yellow.

Habitat.—Generally on litter of subalpine coniferous forest, where it sometimes forms extensive carpets of interwoven plants.

Similar Species.—Can be confused with *Rhytidiadelphus triquetrus* (*see* notes under that species) and also *Rhytidium rugosum,* from which it differs in the fact that the *Rhytidium* lacks pleated leaves; the leaves have revolute margins and possess a single costa.

Distribution in B.C.—Probably at high elevations throughout the Province, frequent in the mountain hemlock-yellow cedar forest, but also in subalpine fir forests and other montane forests.

Range.—Endemic to Western North America, from Alaska southward to California and eastward to the Rocky Mountains, extending as far south as Montana.



Rhytidiopsis robusta

***Rhytidium rugosum* (Hedw.) Kindb.**

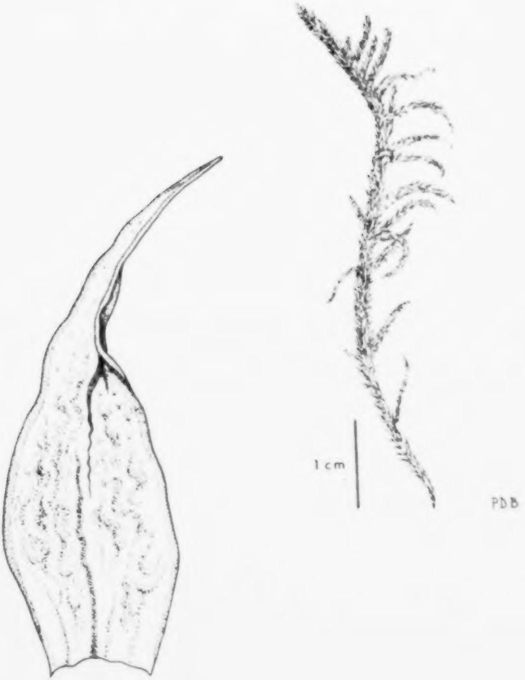
Gametophytes golden-brown to pale green, of rigid brittle shoots, little branched to regularly branched, forming interwoven mats of erect to suberect shoots 2.5–10 cm. long. Leaves imbricate wet or dry, sometimes somewhat secund. Stems yellowish to green. Leaves ovate to ovate lanceolate, 3–4 mm. long, 2 mm. wide, margins revolute, with a single costa running about one-third length of leaf; leaves rugose (*see* figure opposite).

Sporophytes rare; unknown in B.C. material.

Similar Species.—Might be confused with *Rhytidiopsis*; *see* notes under that species.

Distribution in B.C.—Commonest in calcareous substrata in mountains of the Interior and in the north-eastern half of the Province, where it can form extensive mats in the tundra; usually in very sunny habitats.

Range.—Circumpolar in both arctic and boreal regions of North America and Eurasia and extending down mountains of both Eastern and Western North America southward to Guatemala, also in African mountains.



Rhytidium rugosum

Schistostega pennata **(Hedw.) Hook. & Tayl.**

Gametophytes like tiny fern fronds, but thin and translucent; sterile shoots 3–8 mm. long, erect to suberect, bluish-green. Leaves two-ranked, whole plant flattened, leaf bases fused to each other, so that the whole " frond " resembles a single pinnately lobed leaf, the " lobes " each 1–1.5 mm. long, 0.5–0.7 mm. wide at base, without costa, cells large, visible under a hand-lens as a network. Protonema frequently visible, luminous by reflected light. Lower stem red and leafless. Perichætial shoots leafless, except for the tuft of small lanceolate leaves at the shoot apex. Calyptra small, rarely seen.

Sporophytes at apex of perichætial shoot. Seta green, somewhat twisted when dry, 3 mm. long, smooth. Capsule spherical, 0.1 mm. long, 0.1 mm. wide, or less. Operculum like a convex lens. Peristome absent. Sporophyte maturing in spring.

Habitat.—In shallow caverns, and on raw earth of overturned tree roots in swampy portions of cedar-hemlock forest.

Similar Species.—Might be confused with small species of *Fissidens,* like *F. limbatus, F. pauperculus,* and *F. minutulus,* but in *Fissidens* the leaves have a conspicuous sheathing flap and the capsule has a conic operculum and a red peristome.

Distribution in B.C.—In the humid Coastal forest and also in the humid coniferous forest of the Interior to the Rocky Mountains.

Range.—Circumboreal but local in the Northern Hemisphere in both Eurasia and North America.

Notes.—Often termed " luminous moss "; the protonema has lens-shaped clusters of cells that reflect light. Since this moss grows in somewhat shaded sites, the protonema often " glows " a vivid yellow-green.

9

Scleropodium obtusifolium (Hook.) Kindb.

Gametophytes forming tight glossy golden- to yellow-green to light-green mats of interwoven irregularly branched shoots 2–10 cm. long, the branches 0.6–1.5 cm. long. Stems green to yellowish. The leaves imbricate when wet or dry, giving the shoots a worm-like appearance. Leaves ovate, somewhat obtuse, the upper margins involute, giving the leaf a spoon-like appearance, 2 mm. long, 1 mm. broad, the costa forming a thin central line three-quarters the length of the leaf. Perichætial leaves lanceolate, clasping the base of the seta. Calyptra smooth, conic, early deciduous.

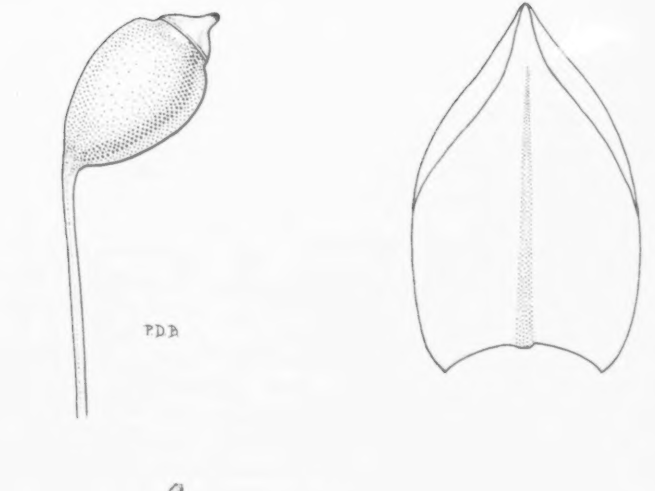
Sporophytes borne on lateral perichætial branches arising on the main shoot far back from the apex, and perpendicular to the main shoot. Seta rough, not glossy, 1–1.5 cm. long; capsule erect to suberect (sometimes inclined) ovoid, barely glossy, red-brown, 2–2.5 mm. long, 1.5 mm. in diameter. Operculum conic, 1 mm. long. Peristome double, the outer teeth red-brown. Sporophytes maturing in early spring.

Habitat.—On wet rock, frequently accumulating silt on boulders in streams and rivers and on the streamside outcrops and boulders perennially flooded or splashed; also in seepy cliffs both near the sea and in mountains. In sunny habitats the plants tend to be more golden in colour.

Similar Species.—Likely to be confused with *Scleropodium tourettei,* from which it is not easily distinguished on hand-lens characters. *Eurhynchium riparioides,* of similar habitats, has the leaves never cucullate, thus the leaves are divergent rather than imbricate and the stems are never worm-like in appearance.

Distribution in B.C.—Frequent in the Coastal region eastward to the Cascade Mountains at least, also present along mountain streams of the Columbia and Rocky Mountains.

Range.—Endemic to the western portion of North America from Alaska southward to California and eastward to Alberta and Montana at least.



Scleropodium obtusifolium

Scouleria aquatica Hook.

Gametophytes forming dense dark-green to black tufts of suberect to pendent irregularly branched shoots 1–10 cm. long, not glossy; rhizoids confined to base of shoot (except on leaves), attaching the shoot to the substrate. Branches 0.3–1.5 cm. long. Stems red-brown to black, obscured by leaves. Leaves strongly divergent to nearly squarrose when wet, imbricate when dry, the lower leaves blackened and eroding with age to leave only the costa. Leaves ovate-lanceolate, 3.5–4 mm. long, 1–1.5 mm. wide at base, margins plane, darker than the body of the leaf, with distant teeth toward the apex. Costa forming a ridge on the back of the leaf and extending nearly to the apex; red-brown to black, usually with numerous short reddish rhizoids near the base. Perichætial leaves lanceolate, forming a short lateral tuft. Calyptra smooth, cucullate, early deciduous.

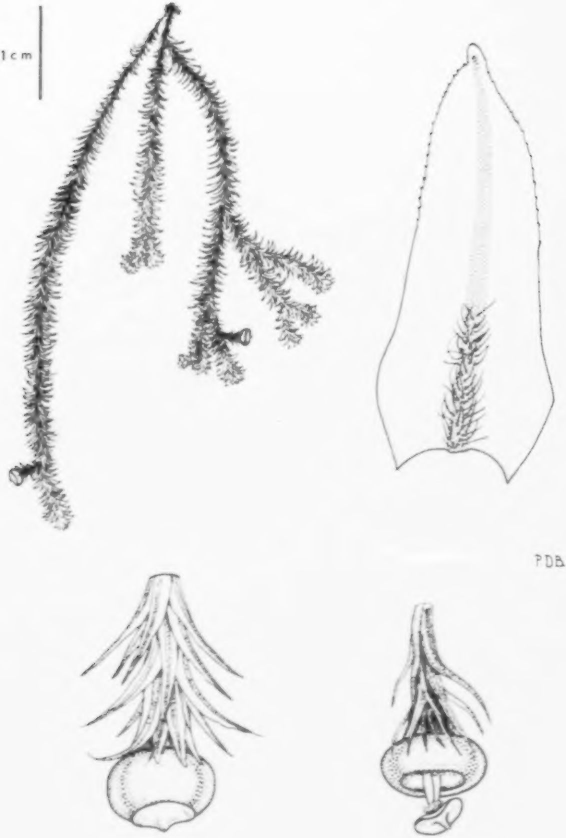
Sporophyte immersed to slightly emergent from the perichætium, borne on a short lateral branch either on the main shoot or on some of the larger branches. Seta inconspicuous. Capsule black, smooth, and barely glossy when mature and dry, flattened subspherical, 1–1.5 mm. long, 2 mm. in diameter, shrinking in length so that the operculum remains raised up on its pedicel of thick columella, the short conic operculum usually bearing a skirt-like mass of tissue below its rim. Peristome barely apparent at 12×, of red-brown teeth. Sporophytes maturing in summer.

Habitat.—On boulders and outcrops in and on banks of rapid-moving watercourses, subject to splash or perennial submergence, forming extensive black masses on boulders of river margins. Often associated with *Grimmia alpicola* and *Rhacomitrium aciculare*. From sea-level to subalpine, but uncommon in subalpine localities.

Similar Species.—Can be confused with *Rhacomitrium aciculare* (*see* notes under that species). It differs from *Grimmia alpicola* in the fact that the *Grimmia* has elliptic capsules, conspicuous red-brown peristome teeth, the operculum is not persistent, and the costa lacks rhizoids.

Distribution in B.C.—Throughout the Coastal region eastward to the Cascade Mountains, also in the Rocky Mountains and the ranges adjacent to them.

Range.—Endemic to Western North America from Alaska southward to California, eastward to western Alberta and Montana.



Scouleria aquatica

Sphagnum capillaceum **(Weiss) Schrank**

Gametophytes of erect plants with branches in fascicles (clusters), usually 3–5 branches in each fascicle, 2–3 divergent and the remainder clinging downward on the stem. Shoot apex a tight rounded cluster of branches, these branches usually bluntish, the branches of the fascicles tapering. Plants forming tight relatively soft tufts or loose thick mats of pale green to a deep red or red-purple colour, with the stems frequently reddish, 5–15 cm. long, sometimes longer; fascicle branches 3–10 mm. long, those of the apex 1–3 mm. long. Branch leaves loosely erect spreading (wet or dry) narrowly ovate, tapering to a tattered (4–5 toothed) apex, the apical portion somewhat channelled, margins entire; costa, none. Perichætial branches several in the apical cluster, usually somewhat larger than other leaves. Calyptra smooth, white, rarely seen.

Sporophytes on a short stalk emerging from the perichætium (1–2 mm. long). Capsule dark brown, subspherical 1–1.5 mm. long, 1–1.5 mm. broad, contracted around equator when dry. Peristome none. Sporophytes not commonly observed since they persist a very brief time, and growth of the shoots obscures them. Sporophytes maturing in summer.

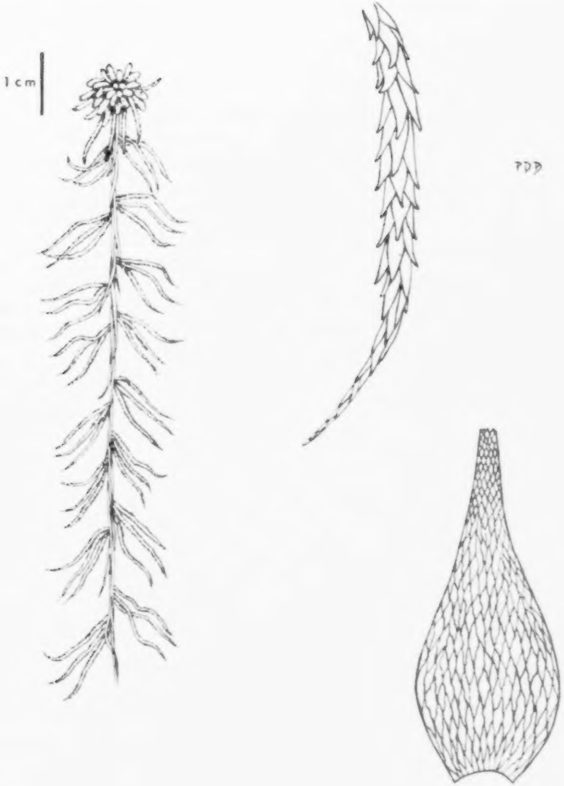
Habitat.—A very common species in open bogs both at sea-level and to subalpine elevations, sometimes forming the dominant cover of the bog.

Similar Species.—Can be readily confused with many other species of *Sphagnum*. *S. fuscum* is very similar but is of a rusty-brown colour; *S. tenellum* is generally smaller, softer, and yellow-green in colour, producing numerous red-brown sporophytes in late spring to early summer; *S. subsecundum* is frequently of a bright orange-brown colour and the divergent branches of the fascicles are curved. Many other species of the genus are not readily separated on hand-lens characters.

Distribution in B.C.—Found throughout the Province, except in the arid Interior; commonest in Coastal areas and in the boreal portion of the Province.

Range.—Circumpolar in the Northern Hemisphere, also found in South America.

Notes.—This species is now generally treated as *Sphagnum nemoreum* Scop. The description above would also include *Sphagnum rubellum* Wils.



Sphagnum capillaceum

Sphagnum palustre L.

Gametophytes of whitish-green loose to tight mats of erect shoots, 5–20 cm. deep, sometimes deeper. Branches in fascicles (clusters), usually 4–5 per fascicle, 2 or 3 divergent, the remainder pendent against the stem. Branches 0.5–1 cm. long, the apex somewhat tapering, swollen and worm-like (wet or dry). Apical branches in a rounded tight head. Stem with dark-brown interior (visible by scraping away leaves), rigid and brittle when dry. Branch leaves broadly ovate, with margins incurved to give it a spoon-shape, apex blunt, 1–2 mm. long, 1–2 mm. broad; costa none; network of cells conspicuous at 12×. Perichætial branches in terminal cluster, larger than other terminal branches. Calyptra smooth, inconspicuous, rarely seen.

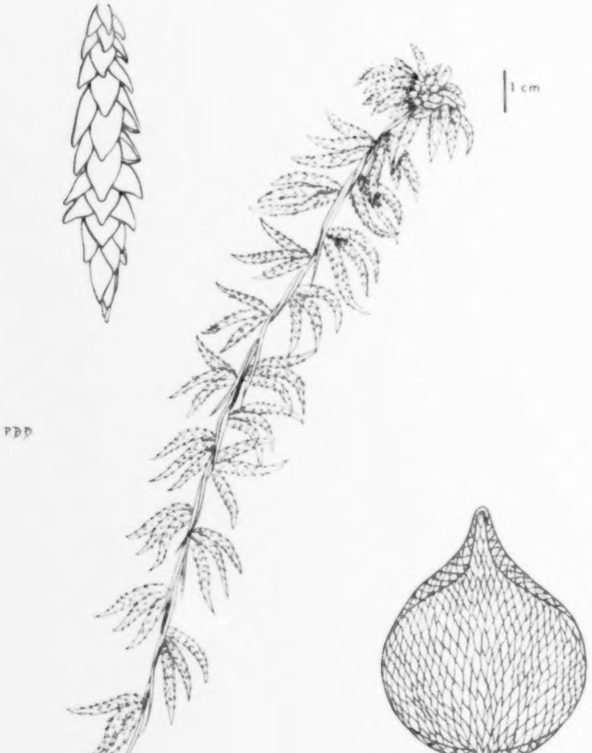
Sporophytes several from each " head " of each shoot; capsule emergent from perichætial leaves by a whitish shoot 3–5 mm. long. Capsule subspherical, red-brown, 2–3 mm. long, 1.5–2 mm. in diameter, contracting below flaring mouth when dry, operculum convex. Peristome none. Sporophytes maturing in summer.

Habitat.—Commonest in somewhat shaded swampy to boggy sites, particularly near water-bodies, sometimes in open bogs.

Similar Species.—Related species are not readily distinguished on hand-lens characters: *S. magellanicum* and *S. centrale* usually are pinkish or reddish (*S. palustre* is always pale green), *S. imbricatum* is frequently orange to golden-brown and often forms hard tight tufts, and *S. papillosum* is frequently a dull-green or brownish to grey colour. Unfortunately all of these species can be pale green as well, and are thus indistinguishable from *S. palustre*. In *Sphagnum* it is thus convenient to say that a species is of the " *Sphagnum palustre* group."

Distribution in B.C.—Probably throughout, except in the arid Interior, from sea-level to subalpine elevations.

Range.—Widespread in the boreal portion of the Northern Hemisphere.



Sphagnum palustre

Sphagnum squarrosum Crome

Gametophytes of erect pale-green shoots forming loose mats 5–10 cm. deep. Lateral branches in fascicles (clusters) of 5, 2–3 divergent, the remainder pendent against the stem, 1–1.5 cm. long, appearing rather bristly from the strongly squarrose leaves, tapering to apex. Apical clusters of somewhat slender branches, crowded into a head. Stem with brownish brittle cylinder, obscured by outer cells, but exposed by scraping off leaves. Leaves broadly ovate, narrowing to a broadly acute apex which is strongly squarrose, 2–3 mm. long, 1.5–2 mm. wide. Costa none; leaf cells appearing like a mesh-work at 12×. Perichætial leaves larger than others, on swollen short branches located in the apical tuft. Calyptra inconspicuous, rarely seen.

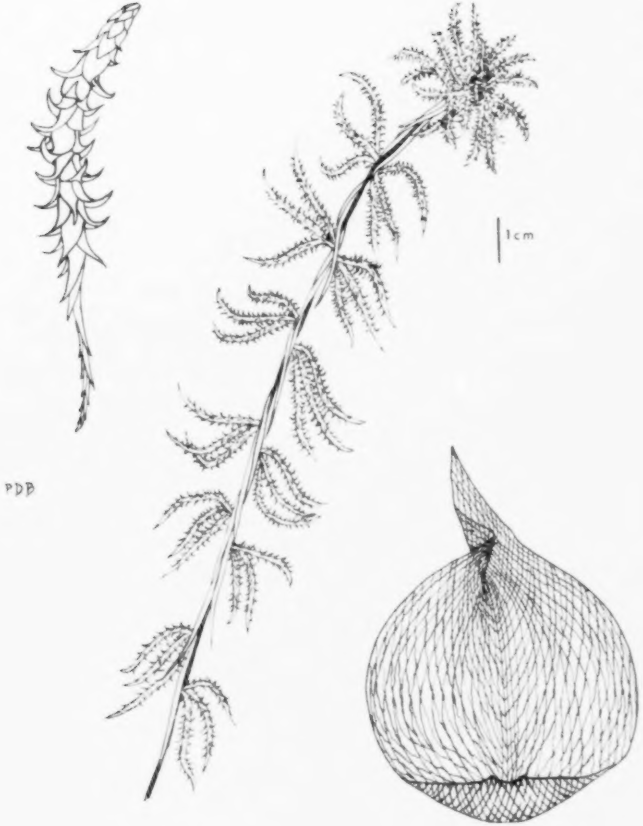
Sporophytes capsule erect, borne on a long stalk 6–7 mm. long, exserting it well beyond the perichætial leaves. Capsule dark brown, subspherical, 2 mm. long, 1.5 mm. in diameter, the operculum convex; capsule contracted below flaring mouth when dry; peristome none. Sporophytes maturing in summer.

Habitat.—Somewhat shaded swampy sites to seepy areas, most frequent on flood-plains of streams and rivers, occasionally in subalpine sites.

Similar Species.—Might be confused with *Sphagnum palustre*, but the squarrose leaves readily separate most specimens. The squarrose leaves and the somewhat shaded habitat are usually sufficient to separate the species.

Distribution in B.C.—Probably scattered throughout the Province, except the arid Interior.

Range.—Widespread in the boreal portion of the Northern Hemisphere, but absent from the grassland and drier climates.



Sphagnum squarrosum

Splachnum rubrum **Hedw.**

Gametophytes forming tufts on substrate, plants pale green, erect, unbranched, 1–1.5 cm. tall, glossy, contorted when dry. Leaves ovate with acute apex, 6–8 mm. long, 3 mm. wide, teeth visible under hand-lens, costa apparent as a ridge on the back of the leaf. Stem green. Leaves forming a rosette-like mass at the shoot apex. Male plants similar to sporophyte-bearing plants. Perichætial leaves like others. Calyptra not conspicuous.

Sporophytes apical on main shoot. Seta soft, red, smooth, often collapsing when dry, 5–8.5 cm. long. Capsule umbrella-shaped with expanded apophysis, bright glossy red-purple, often opalescent red-purple, 4–11 mm. broad, 3–4 mm. long from apex of capsule to fringe of apophysis. Operculum conic, persistent on columella when capsule is mature. Peristome teeth red-brown, recurved and flattened over the rim of the capsule when dry. Sporophyte maturing in summer.

Habitat.—On dung in bogs and swamps of the spruce forest.

Similar Species.—A distinctive species, not likely to be confused with any other moss in the Province. *S. luteum* is similar, but the capsules are yellow.

Distribution in B.C.—Probably locally throughout the spruce forest region in the northern half of the Province. Few collections have been made.

Range.—Circumboreal but local in the Northern Hemisphere: Eurasia and North America.

Notes.—Closely resembles a small mushroom with a very long stalk.

Tetraphis pellucida Hedw.

Gametophytes dark green to pale reddish-brown with age, not glossy, forming colonies of erect plants usually less than 8 mm. tall. Gemma-bearing branches with generally ovate leaves 0.5 mm. long, costa apparent except in the cup-like sheath of 3–4 blunt leaves surrounding the gemmæ at the apex of the shoot. Gemmæ green, lens-shaped, and numerous at the apex of the gemma-bearing shoot. Leaves entire, slightly twisted when dry, costa conspicuous. Sporophyte-bearing plant with upper and perichætial leaves longer and narrower than the lower ones, often 1.5 mm. long, the perichætial leaves parallel to the seta. Stem reddish-brown. Calyptra conic, pleated, covering two-thirds of capsule, apex yellow-brown, lower portion white, the lower margin tattered.

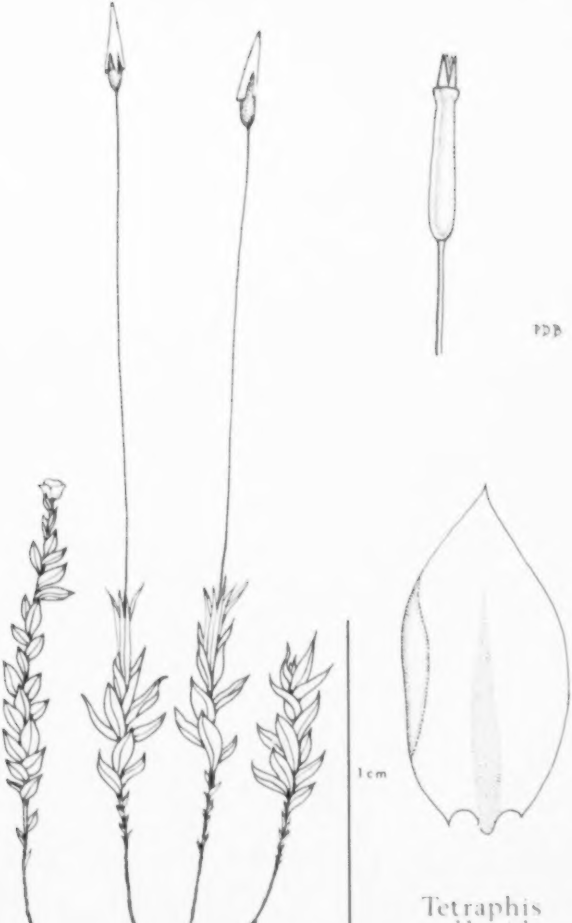
Sporophytes 8–15 mm. tall, including capsule; seta red-brown when mature, twisted when dry, smooth; capsule 2–3 mm. long, erect, cylindric, brownish to yellow-brown when mature, glossy at mouth; operculum conic, often bright red-brown, 1–1.5 mm. long, 0.5 mm. in diameter. Peristome of four brownish teeth, 1–1.5 mm. long, suberect. Sporophytes appearing in summer, but old sporophytes persistent for a least a year after maturity, normally one per erect shoot.

Habitat.—Damp rotten logs in coniferous forests, occasionally on humus banks, often on charred stumps in humid forest.

Similar Species.—Likely to be confused only with *Tetraphis geniculata.* This species has a seta with a distinct angular bend. *Aulacomnium androgynum* frequently grows in the same environment. This species has inclined grooved capsules, more than 4 peristome teeth, the gemmæ are in small spheres at the tip of a nearly naked shoot, and are not enclosed by a cup of leaf-like bracts; the leaves are yellow-green and somewhat toothed.

Distribution in B.C.—Probably wherever coniferous forest is found, with the exception of the drier pine forested areas.

Range. — Circumboreal in Eurasia and North America; in North America south to southern North Carolina in the east and northern California in the west.



Tetraphis
pellucida

Timmia austriaca Hedw.

Gametophytes dark green to bluish-green, not glossy, of erect unbranched shoots forming loose turfs 1–5 cm. deep. Stems red-brown. Leaves strongly divergent from a sheathing base, the long apices at right angles to the stem when wet, somewhat imbricate to incurved and contorted when dry. Margins somewhat incurved, the upper parts with distant teeth (visible at 12×). Leaves lanceolate, gradually tapering to a broadly acute apex. Costa forming a light reddish-brown ridge on the back of the leaf, the sheathing leaf base light reddish-brown. Perichætial leaves similar to others. Calyptra smooth, sometimes persistent on the seta, usually deciduous.

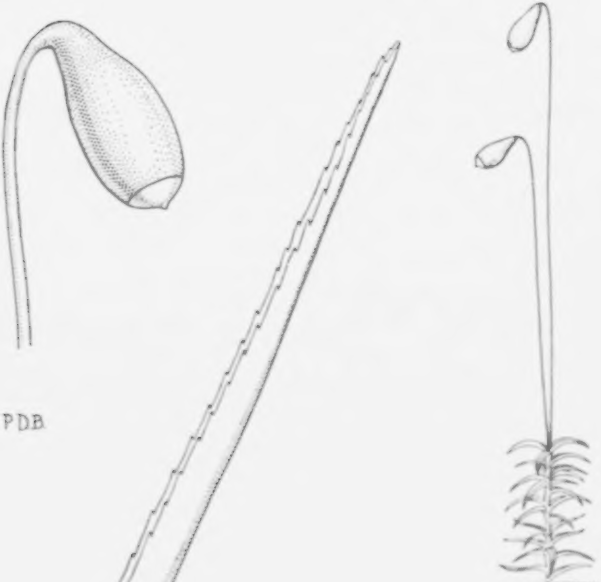
Sporophytes borne at the apex of the shoot. Seta 3–3.5 cm. long, red-brown, glossy, somewhat twisted when dry. Capsule usually nodding, cylindric, greenish to light brown, 4 mm. long, 1 mm. in diameter, glossy, somewhat irregularly grooved when dry. Operculum conic, 0.5 mm. long, yellowish. Peristome double, teeth yellowish to white. Sporophytes maturing in summer.

Habitat.—Rotten logs, forest floor, cliff shelves and banks, usually in coniferous forest in humid climates.

Similar Species.—Might be confused with *Polytrichum* when without sporophytes, but the leaves clearly lack lamellæ, and this can be readily determined at 12×. The long narrow sheathing divergent leaves are likely to readily separate it from any species of *Bryum, Pohlia,* or *Mnium* that might be confused with it.

Distribution in B.C.—Probably throughout wherever coniferous forest is found.

Range.—Widespread throughout the Northern Hemisphere, particularly through coniferous forest regions.



Timmia austriaca

***Tomenthypnum nitens* (Hedw.) Loeske**

Gametophytes of suberect interwoven regularly pinnate branched shoots, forming loose to dense mats 3–9 cm. deep, varying from light green to yellow-green and golden. Branches 0.5–3 cm. long, often curved downward, emerging nearly at right angles to the main stem. Stems yellowish to green, completely obscured by leaf bases and rhizoids. Rhizoids red-brown, largely confined to the back of the costa. Leaves narrowly triangular, entire, 3–4 mm. long, 1 mm. wide at base, with strong pleats parallel to the leaf margins. Costa forming a conspicuous ridge on the back of the leaf. Perichætial leaves lanceolate, sheathing the base of the seta. Operculum conic, smooth, covering upper part of capsule; early deciduous.

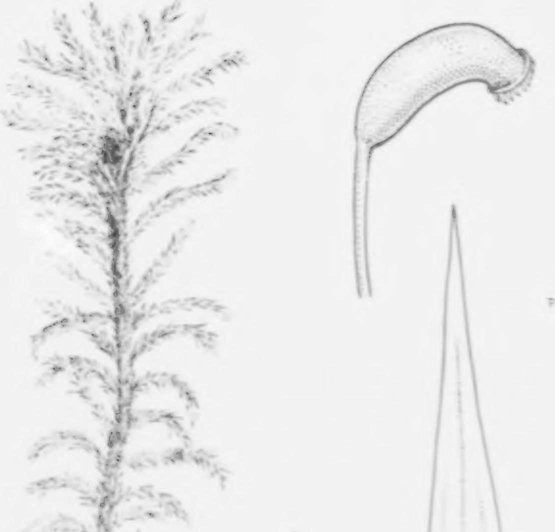
Sporophytes borne on short perichætial branches arising from the main shoot and far back from the apex of that shoot, not abundantly produced in most populations. Seta red-brown, glossy, somewhat twisted when dry, 3–4.5 cm. long. Capsule cylindric, curved, red-brown, somewhat glossy, inclined, 2.5 mm. long, 1 mm. in diameter, somewhat contracted below mouth when mature. Operculum conic, 0.5 mm. long. Peristome double, outer teeth light brown, inner colourless. Sporophytes maturing in summer.

Habitat.—Alkaline swamps and fens.

Similar Species.—May be confused with species of *Homalothecium*, but the habitat and the rhizoids on the costa are not features shared with *Homalothecium;* indeed these two features are enough to distinguish it from any other moss in a similar environment.

Distribution in B.C.—Widespread and often abundant in the northern half of the Province and in the eastern portion and westward to the Lillooet area at least. Not yet found in the Coastal mountains or islands but likely to be found on Vancouver Island at least.

Range.—Widespread in boreal and arctic regions in the Northern Hemisphere.



Tomenthypnum nitens

Tortella tortuosa **(Hedw.) Limpr.**

Gametophytes forming loose to tight yellow-green, not-glossy tufts; shoots erect, unbranched to little branched, 1–4 cm. deep, the lower portions light brown (when dry). Stem red-brown, usually with reddish-brown rhizoids. Leaves strongly contorted when dry, divergent to somewhat contorted when humid. Leaves narrowly lanceolate, margins plane but undulate in upper portion, 8–10 mm. long, 0.5 mm. wide (or less) at base. Costa apparent as a whitish glossy ridge on the back of the leaf. Perichætial leaves similar to other leaves. Calyptra smooth, cucullate, covering half of capsule, early deciduous.

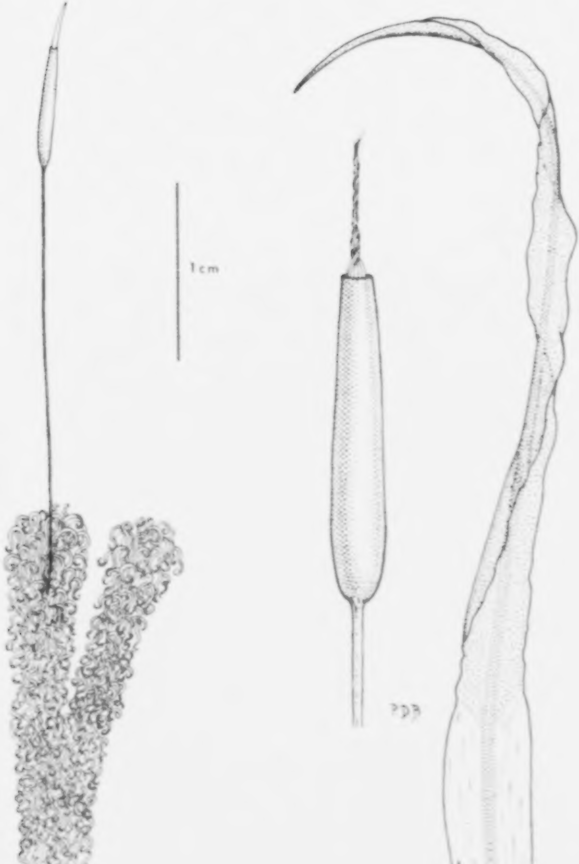
Sporophytes apical on main shoot, infrequently produced in many populations. Seta red-brown, glossy, somewhat twisted when dry, 2–3 cm. long. Capsule erect, red-brown, barely glossy, cylindric, 3 mm. long, tapering toward mouth, 0.5 mm. in diameter. Operculum long conic, 1 mm. long. Peristome of hair-like corkscrew teeth, 1 mm. long. Sporophyte maturing in spring to summer.

Habitat.—Frequent on calcareous cliffs at all elevations, but also on cliffs of acid rock, sometimes an epiphyte on pine and yellow cedar in fens and subalpine forest slopes, also in tundra habitats.

Similar Species.—The yellow-green, strongly contorted leaves generally separate this species from all others. *Ulota obtusiuscula*, which superficially resembles it, can be separated on the basis of its hairy calyptræ, grooved capsules, and double peristome. A number of other species of *Tortella* are not easily distinguished by hand-lens characters.

Distribution in B.C.—Probably throughout the Province, but restricted in the low-elevation coniferous forests, except on the coast itself.

Range.—Widespread in the Northern Hemisphere, rare in the Southern Hemisphere (Fuegia).



Tortella tortuosa

Tortula muralis Hedw.

Gametophytes forming tight mats or tufts of erect little-branched to unbranched shoots, 0.4–0.5 cm. high, appearing dark green to bluish-green when moist, nearly white when dry, largely due to the conspicuous hair points of the leaves, never glossy. Stem red-brown. Leaves strongly spreading when moist, incurved and somewhat contorted when dry. Leaves tongue-shaped, abruptly tapering to hair point, the body of the leaf 3–3.5 mm. long, 1 mm. broad at the base, the excurrent white hair point 0.5–1 mm. long. Lower part of leaf colourless, the upper part green, margins recurved to revolute. Costa apparent as a brownish ridge on the back of the leaf. Perichætial leaves like others. Operculum cucullate, smooth, covering upper half of capsule, early deciduous.

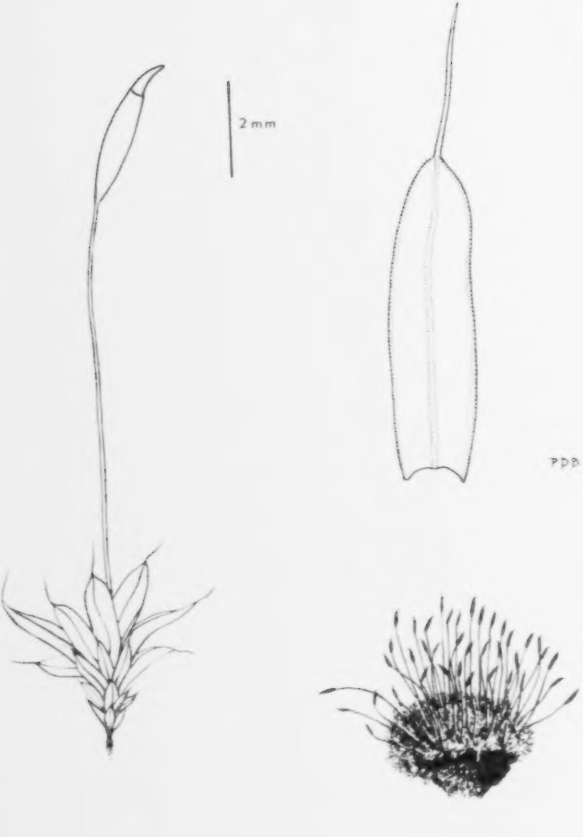
Sporophytes apical on main shoot. Seta red-brown, glossy, somewhat twisted when dry, 1–1.5 cm. long. Capsule cylindric, barely glossy, dark brown to red-brown, 2.5 mm. long, 0.5 mm. in diameter. Operculum conic 0.5 mm. long. Peristome teeth hair-like, corkscrew twisted, bright red-brown. Sporophytes maturing in winter to spring.

Habitat.—On concrete faces, mortar of walls and chimneys, stucco of buildings, and occasionally on bark at tree bases, common in cities or towns of the south Coastal region.

Similar Species.—Might be confused with *Grimmia pulvinata*, but the cylindric capsules that lack grooves and the twisted peristome readily separate it. Any moss with this type of twisted peristome and with short gametophytes bearing hair-pointed leaves is likely to be *T. muralis*. Other species of *Tortula* of a similar habitat have the peristome with a conspicuous white collar at the mouth of the capsule. Species of *Barbula* that have the red twisted peristome lack the hair points on the leaves.

Distribution in B.C.—Throughout the southern portion of Vancouver Island and the islands of the southern Strait of Georgia and in the Vancouver area of the Mainland; so frequent in cities that it was included in spite of its apparent absence from the remainder of the Province. Possibly introduced to the Province, probably since white man colonized the area.

Range.—Cosmopolitan—scattered in the Northern Hemisphere in Eurasia and North America, but absent in all of Canada except British Columbia, widespread in the United States and Mexico.



Tortula muralis

Tortula princeps (Hedw.) De Not.

Gametophytes of erect, irregularly branched, bluish-green to reddish-brown shoots forming loose tufts or mats 1.5–5 cm. deep. Leaves of apex of shoot usually green, but those of older portion light red-brown (when dry). Stems greenish. The leaves strongly spreading to squarrose when moist, forming a flower-like rosette at the shoot apex, imbricate and somewhat twisted when dry. Leaves tongue-shaped, 3–4 mm. long, 2 mm. broad at base, abruptly narrowing to white toothed hair point, 0.5–1 mm. long, margins recurved. Leaf base colourless, the rectangular cells visible at 12×, the upper part of the leaf green. Costa red-brown, forming a glossy ridge on the back of the leaf. Perichætial leaves like others. Calyptra smooth, cucullate, covering upper half of capsule, early deciduous.

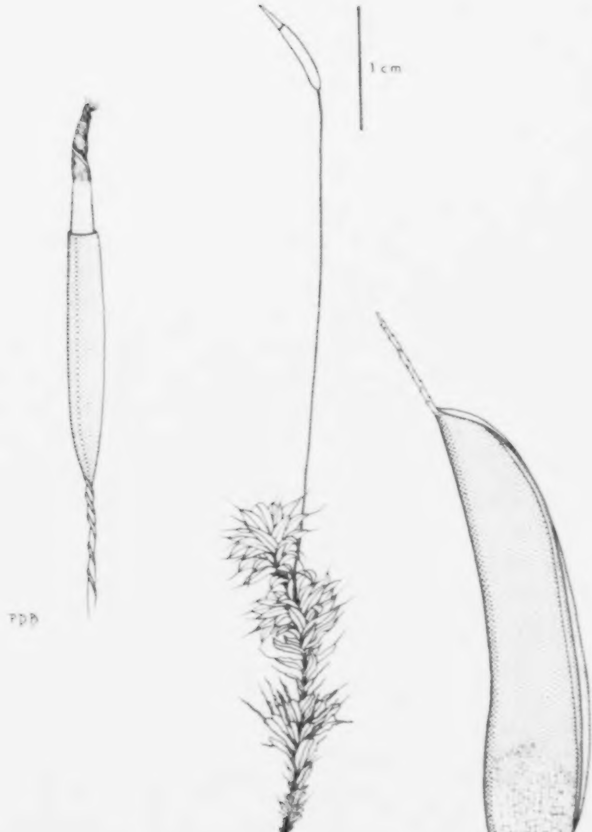
Sporophyte terminal on main shoot. Seta red-brown, glossy, twisted when dry, 2–3 cm. long. Capsule erect, cylindric, barely glossy, dark brown to red-brown, 5–6 mm. long, 1 mm. broad; operculum conic, 2–3 mm. long. Peristome white, of a lower sleeve from which the very corkscrew twisted teeth emerge, 2–3 mm. long. Sporophytes maturing in spring.

Habitat.—On sunny cliff shelves, stone walls, and an epiphyte on *Acer macrophyllum* and *Quercus garryana* trunks.

Similar Species.—Cannot be readily distinguished from various species of *Tortula*, at least on hand-lens characteristics: *T. ruralis*, a very widespread species, is most likely to be confused with it, but also *T. intermedia*, *T. ruraliformis*, and *T. norvegica*. Except in the south-western part of the Province, a specimen keying out to *T. princeps* is likely to be *T. ruralis*.

Distribution in B.C.—Commonest in the Coastal region from Vancouver Island northward to the Queen Charlotte Islands, extending on the Mainland up the Fraser River as far as Lytton at least. *T. ruralis*, a species likely to be confused with it, is common throughout the Province at all elevations, especially in the arid Interior and through the drier coniferous forests, where it sometimes forms extensive carpets.

Range.—Scattered in the Northern Hemisphere, commonest in Mediterranean climates—in Europe, Asia, North Africa, Pacific North America; in the Southern Hemisphere in New Zealand.



Tortula princeps

Ulota obtusiuscula C. M. & Kindb.

Gametophytes forming loose rounded yellow-green, somewhat glossy cushions of many irregularly branched shoots emerging from a single central area. Shoots 1–1.5 cm. long, branches 0.5–1 cm. long. Stems red-brown, obscured by leaves. Leaves imbricate, corkscrew twisted when dry, divergent but with incurved tips when moist. Leaves lanceolate, 3–4 mm. long, 0.5 mm. wide, tapering to a bluntish apex. Costa red-brown, forming a ridge on the back of the leaf. Perichætial leaves like others. Calyptra bell-shaped, yellow to brownish, with long scattered divergent hairs, persistent until the capsule is mature.

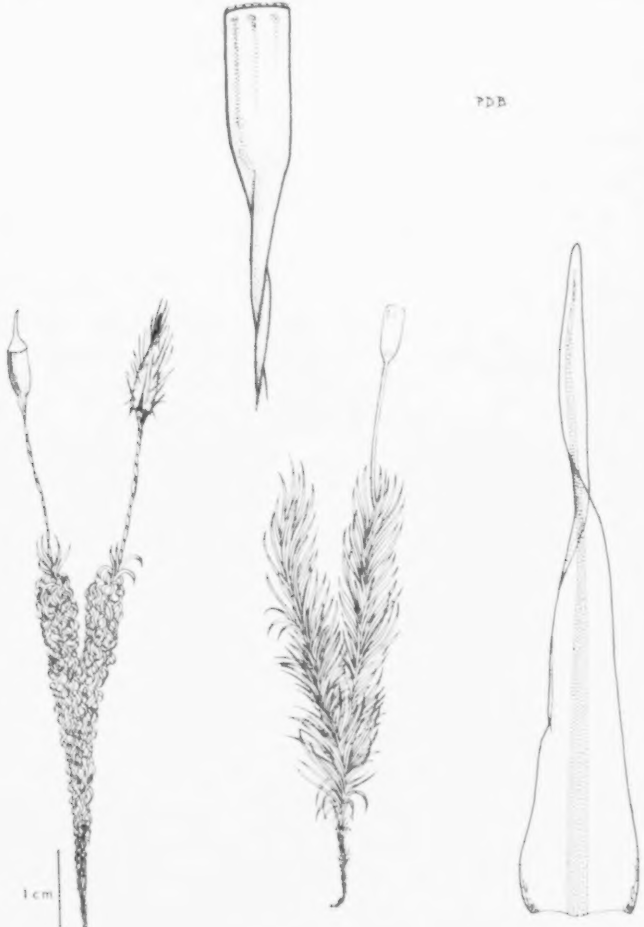
Sporophytes borne at apex of main shoots, abundant. Seta smooth, light brown, glossy, grooved and gradually tapering to capsule when dry, 1–1.5 cm. long. Capsule elliptic to cylindric, 1–1.5 mm. long, 0.5 mm. in diameter, its limits often difficult to determine from the seta that grades into it, with regular parallel grooves when mature, slightly contracted below the mouth when dry, somewhat glossy. Operculum conic, light yellow, 0.5–0.7 mm. long. Peristome double, the outer teeth light brown to yellowish, the inner colourless; the outer reflexed over the rim of the capsule mouth, the inner incurved or erect, narrow. Sporophytes maturing in spring to early summer.

Habitat.—Epiphytic on trunk and branches of *Acer macrophyllum*, *Alnus*, and other deciduous trees.

Similar Species.—Nearly all species of *Ulota* in the Province will key out to this species. Hand-lens characters are inadequate to separate the species. The cushion habit and the epiphytic habitat combined with grooved capsules, contorted leaves, and hairy calyptra are enough to separate this genus from all others except a few species of *Orthotrichum*.

Distribution in B.C.—Very common in the Coastal regions as far eastward as Hope at least.

Range.—Endemic to Western North America from Alaska southward to Oregon.



Ulota obtusiuscula

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